

**MANUAL OF INSTRUCTION
CUSTOMER ENGINEERING**

**IBM ELECTRIC TYPEWRITERS
MODELS 01-10**

INTERNATIONAL BUSINESS MACHINES CORPORATION

590 MADISON AVENUE, NEW YORK, NEW YORK

FORM 25-8194-0

PART #1067094

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INTERNATIONAL BUSINESS MACHINES CORPORATION

ELECTRIC TYPEWRITER DIVISION

FOREWORD

The purpose of this manual is to assist customer engineers in the servicing of IBM Electric Typewriters.

This manual is compiled from methods and adjustments used at the factory, together with suggestions from the field which have been approved by the Engineering Department. It represents methods that experience has proved best in servicing the equipment.

As new developments and improvements are introduced, new sections and additional pages to the present sections may be added to this manual. It is in loose-leaf form so that new material can be easily added.

GENERAL INSTRUCTIONS FOR ORDERING PARTS

A. BRANCH OFFICE STOCK PARTS

1. Use Supply and Parts Requisition Form No. 606-0 for supplies and parts when shipment is to be made direct to the sales office. Make up in five copies and send the first four copies of the form to the Order Department in Rochester. Retain the pink copy for your files.
 - a. Be sure to fill in branch name and number, date, and local number and have signed by the supervisor in charge of EWM Customer Engineering.
 - b. Use separate orders for parts, ribbons and tools.
 - c. Fill in all prices and extensions where applicable.
 - d. Fill in "Quantity in Stock" Column on each item.
2. Use complete part numbers when ordering parts. Place part numbers in numerical sequence on order blank. If number and name do not agree, the order will be filled from the number.
3. All platen orders will be filled with standard 33 tooth ratchets unless otherwise specified on the order.
4. Use complete part numbers in requisitioning ribbons and specify inking.
5. When ordering type bars specify whether Pica, Elite, Pica Gothic, etc. and also give the position number of the type bars. In the case of characters other than Standard, give catalog location in Type Available Catalog. Key buttons will not be sent with type bars unless ordered.

B. CUSTOMER PARTS SHIPPED DIRECT

1. Use House order 95-6016-0 (green) for parts which are to be shipped direct to customers. Make up in duplicate. Send the original to the Order Department in Rochester and retain the second copy for your files.
 - a. Be sure to fill in date, branch order number, customer purchase order number, and shipping instructions.
 - b. Follow instructions given above with reference to part numbers, platens, type and ribbons.

May 1, 1944

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May 6, 1944

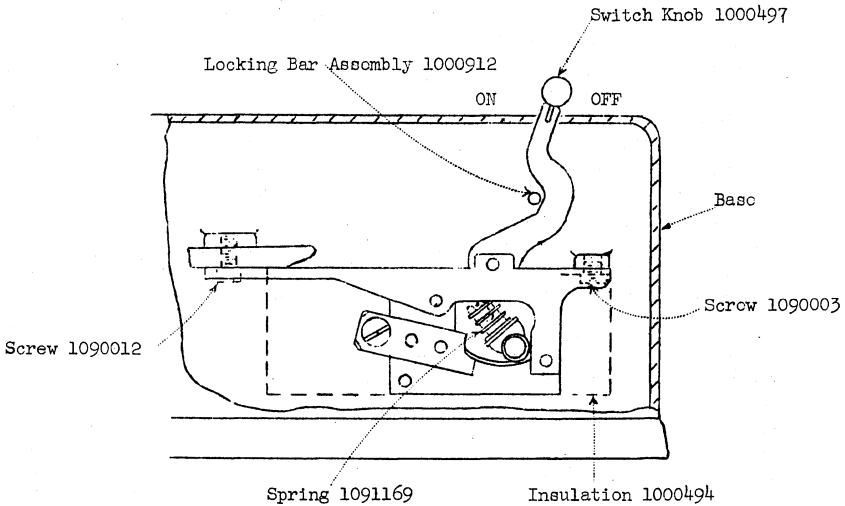
SWITCH 1000490

THE PURPOSE is to turn the power on or off and lock or unlock the keyboard by means of a locking bar. When switch is off the key levers cannot be depressed.

When switch handle is pushed away from the operator the power is ON and the keys are unlocked. When it is pulled toward the operator the power is OFF and the keys are locked.

OPERATOR SHOULD ALWAYS USE SWITCH TO TURN POWER ON OR OFF AND NOT WALL PLUG.

Should it be necessary to pull wall plug, be sure switch is in OFF position so that keys are locked.



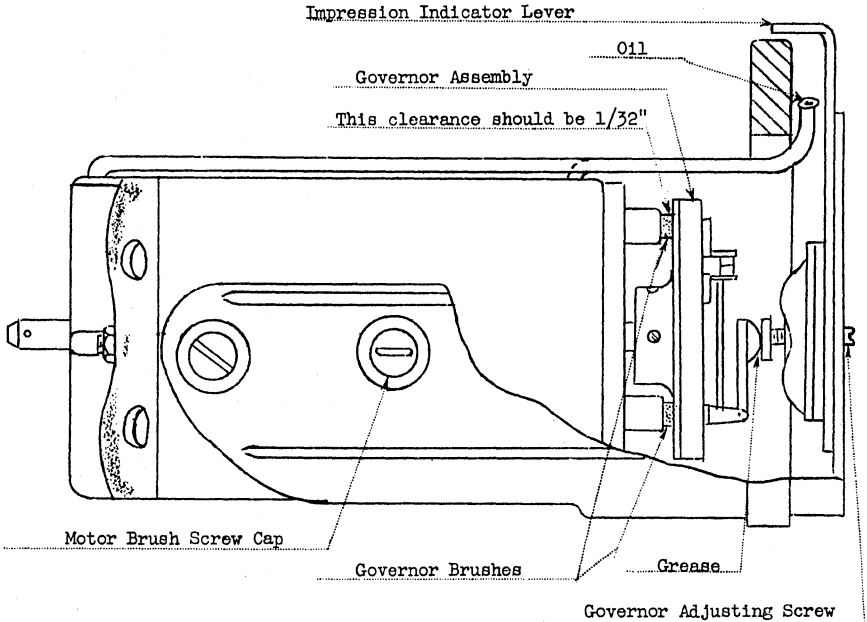
REMOVAL Pull round knob off handle, remove two screws 1090003 and 1090012 and disconnect cord at switch. Be sure to install switch insulation 1000494 when putting switch back in place and that the switch operates the keyboard locking bar.

NOTE On machines which the switch knob will not stay on, form a lip around the hole in the knob using the round part of a small hammer. This lip should slip into the notch already formed in the switch lever.

May 1, 1939

MOTORS

GENERAL ELECTRIC MOTOR (For motor part numbers see "Motor & Electrical Parts" in price parts list.



<u>Frequency Range</u>	- (for AC Motors)	25 to 60 cycles
<u>Voltage Range</u>	- (for 110 volt motors)	90 to 130 volts
	- (2 220 volt motors)	200 to 240 volts
<u>Power Consumption</u>	- (1/60 H.P. rating)	65 watts (approx.)

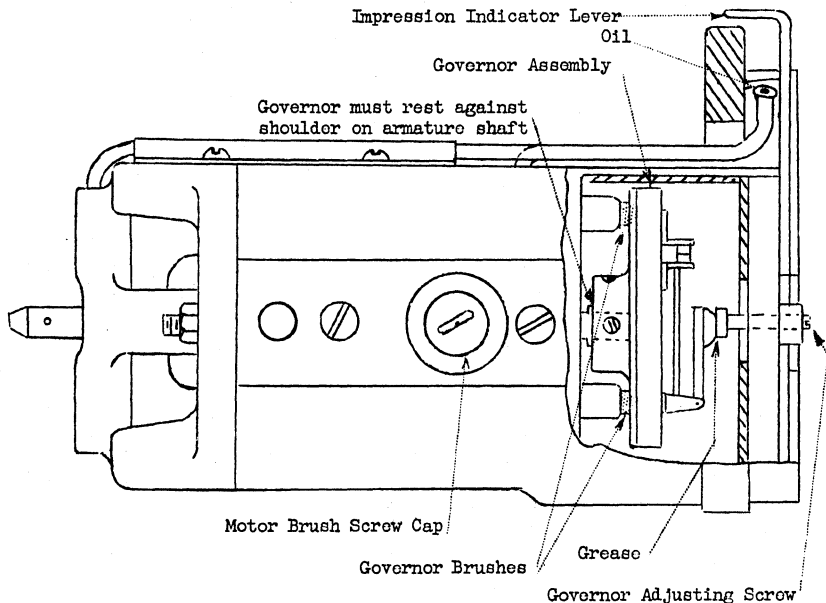
The General Electric Motor is a series wound, governor controlled motor. The speed is varied by changing the governor setting by the impression indicator lever; the speed is constant for a given setting of the governor.

Due to design the motor operates with a minimum of electrical loss and hence the accompanying hum noticed in many motors when operating on alternating current is reduced to a minimum.

Vibration is eliminated by mounting the motor in four, live rubber bushings.

May 1. 1939

WESTINGHOUSE MOTOR - (For motor part numbers see "Motor & Electrical Parts" in price parts list.)



<u>Frequency Range</u>	- (for AC Motors)	50 to 60 cycles
<u>Voltage Range</u>	- (for 110 volt motors)	90 to 130 volts
	- (220 volt motors)	200 to 240 volts
<u>Power Consumption</u>	- (1/60 H. P. rating)	65 watts (approx.)

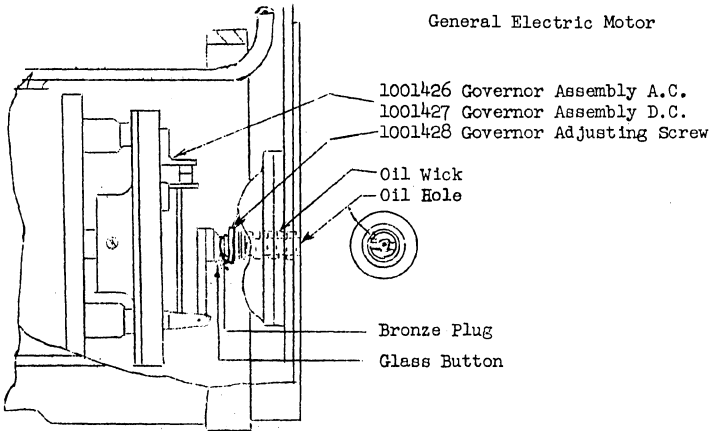
The Westinghouse motor is a series wound, governor controlled motor. The speed is varied by changing the governor setting by the impression indicator lever; the speed is constant for a given setting of the governor.

Due to design the motor operates with a minimum of electrical loss and hence the accompanying hum noticed in many motors when operating on alternating current is reduced to a minimum.

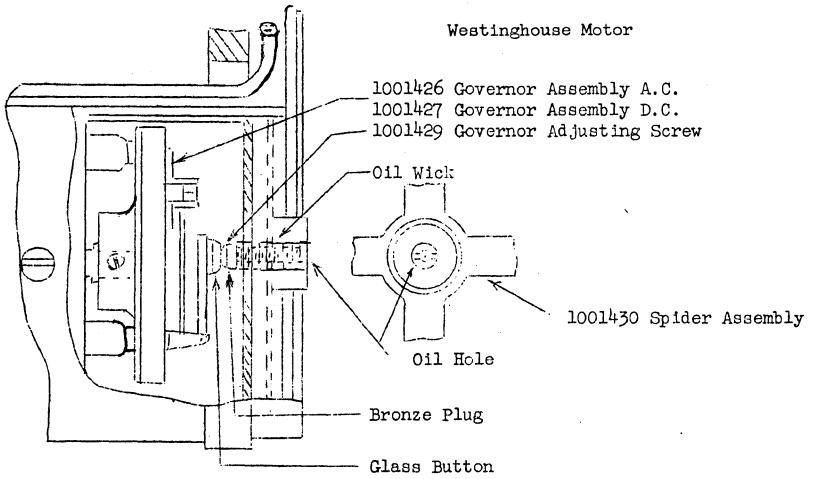
Vibration is eliminated by mounting the motor in four, live rubber bushings.

NOTE: When impression indicator lever moves due to vibrations, remove and twist the four arms on "adjustable spider" to eliminate side movement in grooves.

May 1, 1939



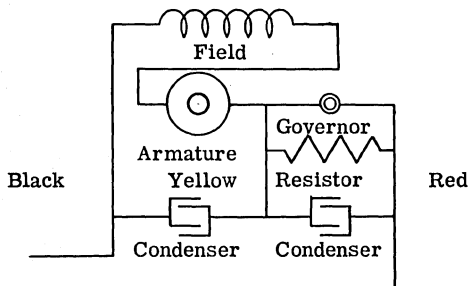
Westinghouse Motor



New Style Governor Butterflies

August 24, 1939

Internal Wiring Diagram



ALTERNATING CURRENT AND DIRECT CURRENT There are two types of motors, one for use with alternating current and one for direct current. Care must be used to see that the correct motor is installed. The motors are stamped (AC) or (DC), in addition, the DC motor has a strip of red paint across the bottom to distinguish it.

LUBRICATION AND INSPECTION Recommend to typists that they apply 6 to 8 drops of IEWM motor oil every six weeks to the two oil ducts located at the rear of the motor.

The governor adjusting screw is lubricated by oiling the wick, extending through the screw, to the oilite bearing point.

MOTOR BRUSHES (Commutator) REPLACEMENT Remove the motor and you will find two motor brushes held in place on opposite sides of the motor by cap screws, 1001296. When brushes are replaced they must be turned so that the concave end of the brush conforms with the curvature of the armature.

When removing brushes for inspection, mark them so that they may be replaced the same as before; plus on right side, and minus on left side.

TO REMOVE THE ARMATURE

- (1) Remove the rear motor plate, governor cover, governor and governor brushes. Lift up the oil tubes, sufficiently so that the oil tube in the coupling end of the motor is completely out of the flange.
- (2) Remove motor brushes, marking them so that they may be replaced with no change in location.
- (3) Loosen the motor cover plates. It is not necessary to remove the screws which hold the plates in position.

April 18, 1946

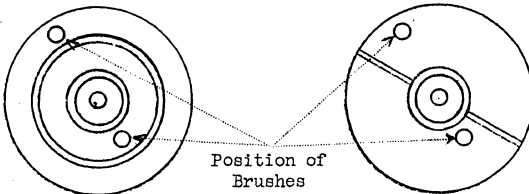
- (4) Remove the nuts holding the flange on the motor and slip the flange off the motor. When removing the flange, it is necessary to work the leads through the lead bushings carefully.
- (5) Remove the armature and any washers which may adhere to the ends of the bearings.
- (6) Place washers for the new armatures as follows:
 - (a) Coupling end. Place one .015 bronze washer next to the shaft shoulder and follow with one 1/2" outside diameter .015" steel washer and on the armature end add enough of the 1/2" diameter .007" and .010" bronze washers on the shaft to reduce the end play with the flange assembled to a maximum of not to exceed .004" or .005" but with sufficient end play to permit turning the motor over freely.
- (7) Governor. Reassemble the motor in the reverse order from which it was disassembled. When locating the governor on the motor shaft, assemble so as to give 1/32" clearance between the collector rings and the ends of the brush holder tubes.

GOVERNOR The governor controls the speed of the motor by opening and closing the circuit. When the motor starts, the governor points are closed and remain closed until the speed of the motor reaches a certain point. Then, due to centrifugal force, the outer point draws away from the inner one which is held by an arm connected to a butterfly lever. This causes the current passing through the motor to be reduced (part of the current to the motor passes through the resistor) allowing the speed to drop off until the points again close. This action of the governor causes the motor speed to be constant.

GOVERNOR ADJUSTING SCREW On the rear cover plate of the motor there is an adjusting screw. Turning this screw clockwise reduces the motor speed; backing the screw out increases the speed. This screw should be regulated so that the correct impression is obtained with the indicator lever set at 4 or 5 on the motor scale (so that the period, comma and hyphen just print).

TYPES OF GOVERNORS There are two types of governors, one for operation on alternating current and one for direct current. The alternating current governor has solid brush collector rings, the direct current governor has a split collector ring.

Alternating
Current
Governor
(1001374
Short Back
Motor)
(1001390
Long Back
Motor)



Direct Current
Governor
(1001375 Short
Back Motor)
(1001391 Long
Back Motor)

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #15

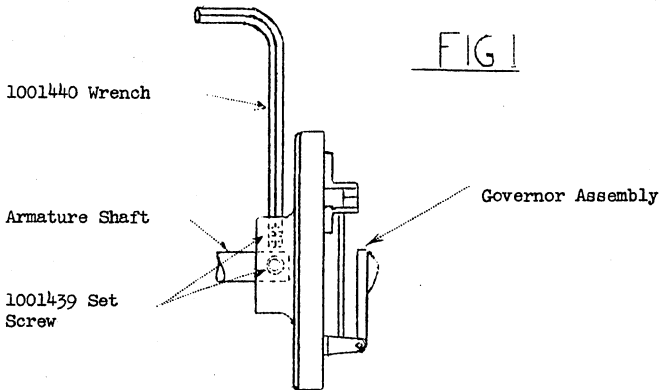
TO: ALL EWM SALES AGENTS, PROVINCIAL MEN AND SERVICEMEN

SUBJECT: GOVERNOR SET SCREW

Motors are now coming into the field with the governor assemblies locked to the armature shafts with a special set screw #1001439 (see Fig. 1). This screw should insure the governor assembly being securely locked to the shaft (see Fig. 1). The screw #1001405 formerly used had a tendency to spread in the governor assembly when being tightened and rather than being tight to the shaft was really binding in governor assembly.

To loosen or tighten this new screw #1001439, it is necessary to use a special wrench #1001440 (see Fig. 1) which we are now shipping to the field.

When repairing motors see that new style screw is used to lock governors to shaft.



December 12, 1939

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #4

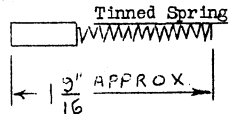
TO: ALL EWM PROVINCIAL SALESMEN AND CUSTOMER SERVICEMEN

SUBJECT: MOTOR BRUSHES (FOR GOVERNOR)

We are receiving motors returned from the field that have been equipped in the field with the wrong kind of motor governor brushes. We have three different kinds of motor governor brushes; their part numbers and descriptions are as follows:

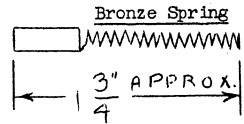
1. Motor Governor Brush #1,001,241
used in General Electric Motors
that have the short governor extension, or the first style used.

General Electric (Short Back)



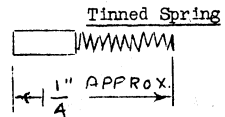
2. Motor Governor Brush #1,001,360
used in General Electric Motors
that have the long governor extension, or the second style used.

General Electric (Long Back)



3. Motor Governor Brush #1,001,248
used in Westinghouse Motors--all
models.

Westinghouse



Many motors are being returned that should not be returned because all they need is a new Governor Assembly and new Governor Brushes.

P.S. Abrasive Brush #1,001,241 should be used in short Governor extension (first style used) motors only. The depth of the brush holder well is different on all three motors--therefore, the brushes are not interchangeable.

April 6, 1939

March 2, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #67

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS

SUBJECT: MOTOR REPAIR

Very often motors are returned to the factory for repair when it would be possible to repair them in the field office. Before sending a motor to the factory as "defective", be sure to make a careful check for possibility of field office repair.

A motor will not perform correctly when one or more of the following items of trouble are affecting it:

1. Improper or worn governor brushes.
GE Governor Brush #1001241 - Short Back
GE Governor Brush #1001360 - Long Back
Westinghouse Governor Brush #1001248
(See Letter of Instruction #4)
2. Dry, gummy or worn bearings.
3. Dirty governor face.
4. Shorted governor.
5. Oil on commutator or governor face.
6. Governor face too far from brush holder.
7. Pitted governor points due to improper voltage.
8. Too much or too little end play.

NEVER REMOVE MOTOR NAME PLATE

Rubber grommets #1001387, motor shims, brush holders, and motor leads are all available in limited quantities. When new rubber grommets are installed on motor mounting, the job is made easier by the application of alcohol to the surface of the rubber as a lubricant.

When ordering any of the above parts, please specify model, type, and voltage of motor taken from name plate. When ordering governor brush holders, please specify color of lead attached.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

GOVERNOR BRUSHES AND COLLECTOR RINGS Under the governor are two cylindrical brushes which make contact with the collector rings. These brushes must be free in their holders and the face of the collector rings against which they operate must be clean. Clean the collector rings with an eraser.

If the collector ring face becomes dirty or if the governor brushes stick, the motor will not come up to speed, will operate unevenly, or will fail to run.

TO REPLACE THE GOVERNOR BRUSHES Use the same procedure as in replacing the governor assembly.

GOVERNOR CONTACT POINTS The motor speed control is dependent upon the action of the governor points hence if these points become pitted or fail to operate correctly for any other reason the speed regulation of the motor will be affected.

A fluctuation of motor speed may be caused by the points having become pitted.

If the governor points become badly pitted they may stick together. Under this condition a very heavy impression will result and the motor speed cannot be reduced by the impression indicator lever.

The governor points can be smoothed off with a thin, fine, flat file.

DO NOT OPERATE AC MOTORS ON DC. The points will become pitted and affect the operation of the motor in a very short time.

REPLACEMENT OF GOVERNOR ASSEMBLY OR GOVERNOR BRUSHES

- (1) Remove the motor.
- (2) Remove the rear motor plate.
- (3) Remove the cover from the governor assembly.
- (4) Loosen the set screws that hold the governor assembly to the motor shaft.
- (5) Replace the governor assembly by sliding it on the shaft so that the set screws are over the flat surfaces on the shaft. Allow the brushes to extend out of their holders against the collector rings $1/32"$.
- (6) Readjust the motor speed by the adjusting screw 1001257, so that the period and comma just print with the impression indicator lever set at 4 or 5.

CAUTION

- (1) Do not turn on the motor with the rear cover plate removed.
- (2) Do not operate AC motors on DC current. The governor points will be damaged.
- (3) Do not operate DC motors on AC current. They will not develop sufficient power.

<u>RESISTOR AND CONDENSERS</u>	Resistor 1001264 -	{ 110 volts AC
		{ 115 volts DC
	Resistor 1001263 -	{ 220 volts AC
		{ 230 volts DC
	Condenser 1001341	{ 110 volts AC
		{ 115 volts DC
	Condenser 1001342	{ 220 volts AC
		{ 230 volts DC

May 1, 1939

The purpose of the resistor is to act in conjunction with the condenser to reduce the arcing across the governor contact points. Also the resistor keeps the armature and field supplied with a small amount of current, thus giving the motor faster pickup.

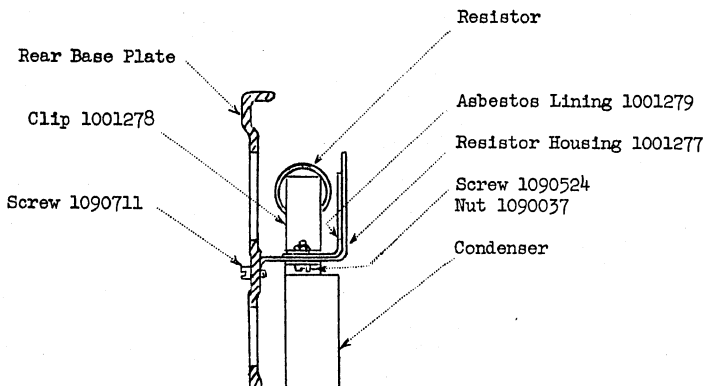
Failure of the resistor can be detected by its failing to be warm when the motor is running.

The condenser box contains two condensers. One acts with the resistor to protect the governor points. The other acts to reduce alternating current hum in the motor.

Under the small load at which the condensers operate there is a very small possibility of their breaking down.

RESISTOR AND CONDENSER INSTALLATION

- (1) The resistor housing must be installed to the rear base casting with self tapping screws 1090711
- (2) The resistor is mounted on its clips so the longest lead comes from the end farthest from the motor.
- (3) The asbestos lining goes under the clips and forms around the bottom and up the inside of the resistor housing.
- (4) The resistor and condenser are held to the housing by the screw 1090524.



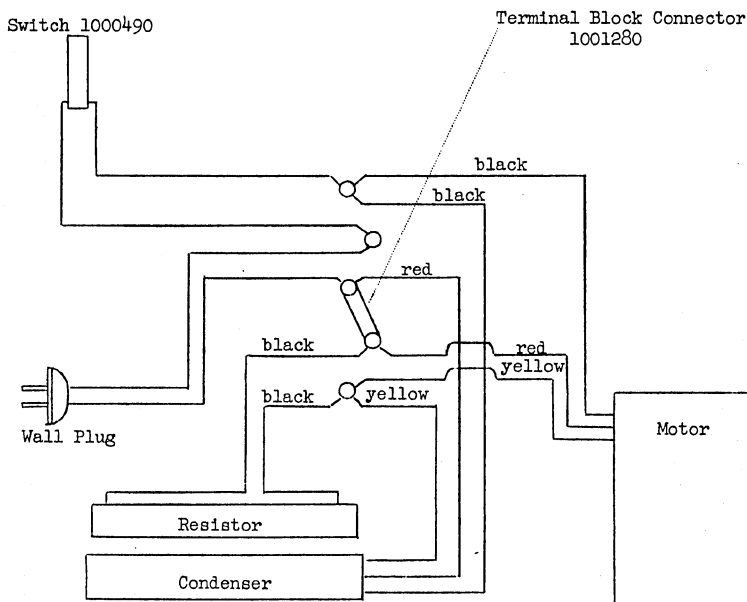
TERMINAL BLOCK AND WIRING The terminal block 1000433 is located on the under side of the machine and is covered by a Bakelite plate. This block serves as a junction point for the leads from the various electrical units.

All connections must be kept tight if the motor is to operate smoothly and continuously. Make sure all terminals are held securely by the terminal nuts, because it is possible for the nuts to be tight on the threads and still leave the terminals loose under them. Look especially at the terminals on the block and the switch.

Be sure the insulation on all wires is in good condition. All wires must be kept free from grease and oil which will deteriorate their insulation.

For use with General Electric and Westinghouse motors make sure the copper terminal block connector 1001280 is in place.

(General Electric and Westinghouse)



May 1, 1939

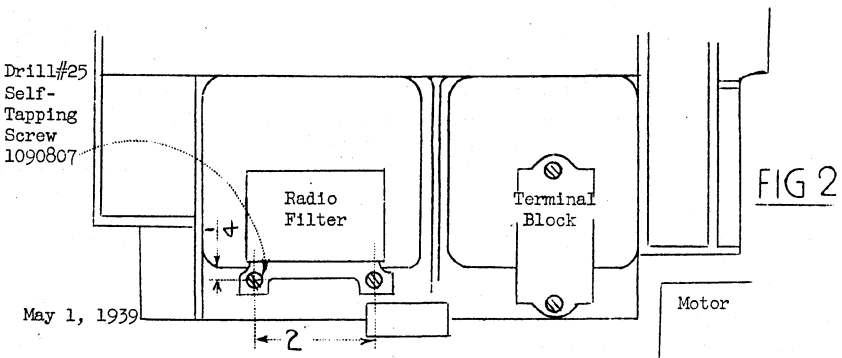
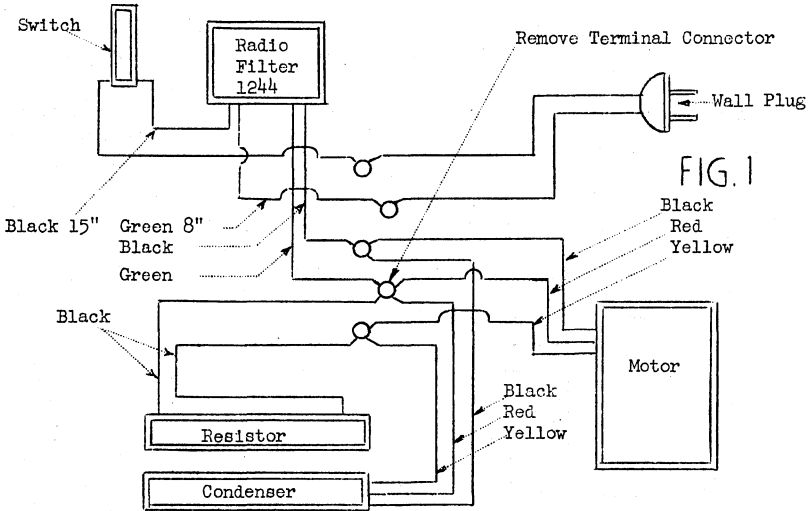
RADIO FILTER The purpose of the radio filter is to eliminate radio interference in cases where the International is installed near a radio receiver or near enough to a broadcasting station to cause interference.

Figure 1 shows the wiring diagram with the radio filter installed. Note that the copper terminal block connector 1001280, on posts 3 and 4 is not used with the filter. Also notice that one of the switch cord wires is replaced by the black filter wire.

Figure 2 shows the filter attached to the underside of the power frame. It is necessary to drill and tap two holes as indicated to install the filter.

Check carefully the wiring before turning on the switch.

The filter is for use with the General Electric and Westinghouse motors.



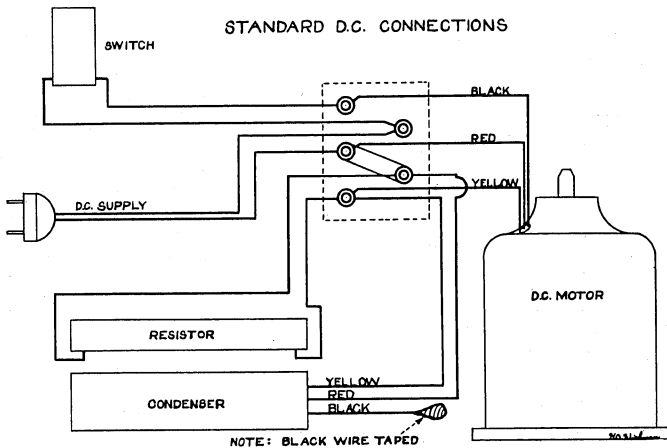
June 10, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #71

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: D. C. CONNECTIONS

When using the Electromatic on a Direct Current line, always disconnect the black condenser lead from the top terminal. This will protect the meters and other delicate instruments connected on the same circuit.

Below is the wiring diagram showing the correct "hook-up" when using Direct Current.



The end of the wire should be taped with at least one thickness of rubber tape and two thicknesses of friction tape.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman:jme

July 1, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #73

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS

SUBJECT: MOTOR, TERMINAL BLOCK, CONDENSER AND RESISTOR CHANGE

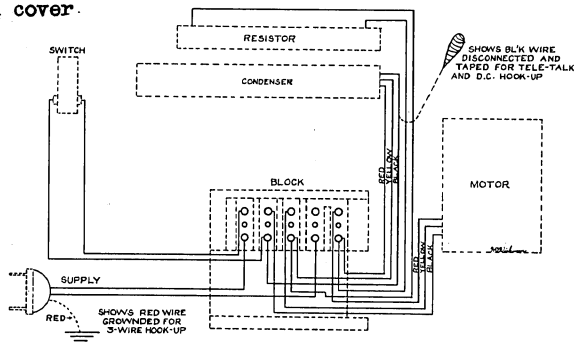
To conform with recent underwriters' specifications, a change has been made in the electrical arrangement of our machine.

The new motors are equipped with a thermoguard which is designed to break the circuit when the motor becomes overheated. It requires approximately one minute for the motor to cool sufficiently to again establish contact. This action should be explained to the operator in order to avoid unnecessary calls.

The thermoguard's presence in a motor can be detected by the fact that the machine's patent plate is located on the motor instead of on the machine base.

The thermoguard motor and the old style motor must not be interchanged.

Changes were also made in the condenser resistor, terminal block and switch cover.



The above drawing shows the wiring diagram for the conventional or regular hook-up, and also shows the hook-up for the teletalk and three wire lead required by certain firms where our machines are installed. The teletalk hook-up also is used when the machine is installed on D.C. current.

Part numbers of the resistor, condenser and terminal block assembly are as follows:

220-V	#1017769
110-V	1017750

R.F. Sheridan
EWM Manager, Cust. Eng.

HOWickman:jme

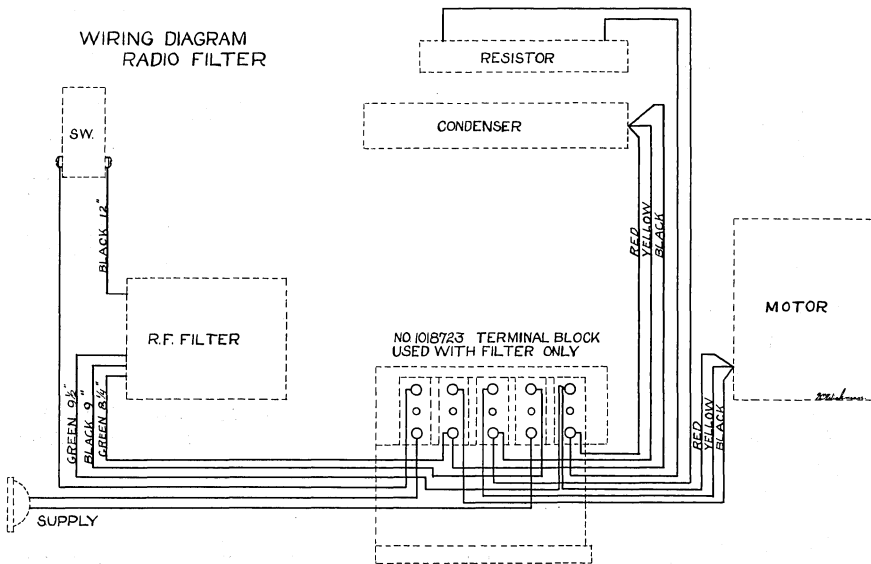
September 15, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #77

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: WIRING AND INSTALLATION OF #18405 RADIO FILTER

The radio filter has been changed to conform with the new wiring diagram of our machine. It is necessary to use terminal block #1018723 with the filter to prevent a short circuit.

The filter has one black 12" lead on the upper side and three leads on the lower side. The wiring is thus concentrated into one cable extending down the side and across the back of the machine.

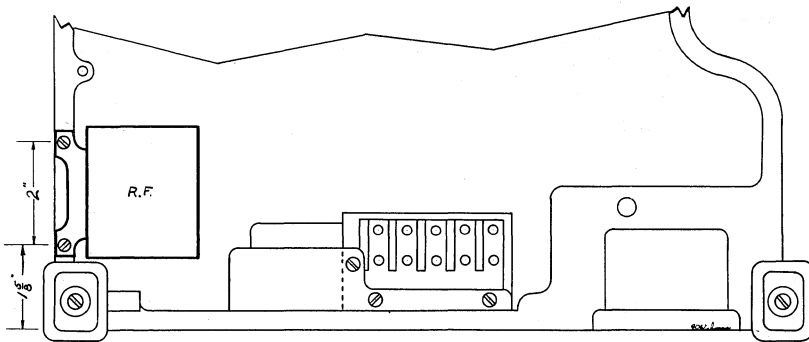


This change takes place on machines bearing serial numbers of 65821 and up.

(over)

110V Resistor-----#1017761	220V Resistor-----#1017762
110V Condensor-----#1017759	220V Condensor-----#1017760
110V Resistor Condensor Assembly #1017750	220V Resistor Condensor As- sembly #1017769
Terminal Block(Standard)-#1017751	Terminal Block(Filter)---#1018723

To install the filter refer to the dimensions on the following drawing. It will be necessary to drill two holes using #33 drill. Tap these holes, using #6-40 tap for screw #1090741 with lockwasher #1090358.



Installation on machines equipped with the old style terminal block #1000433 will be made the same as if filter 1001244 were used. Refer to Section 1, Page 9 of the Manual.

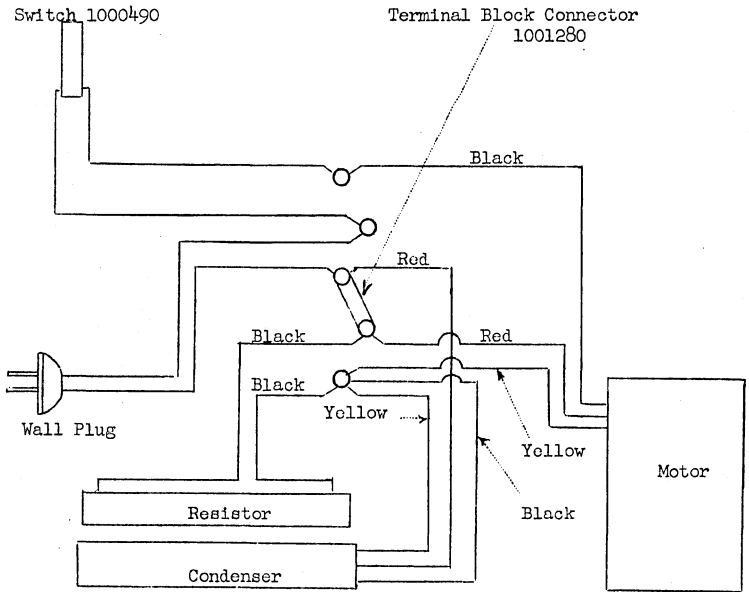
HOWickman:mfh

R. F. Sheridan
EWM Manager, Customer Engineering

Wiring Diagram for Telatalk and Inter-office Communicating Systems.

This diagram is to be used on installations where the motor on the 20,000 series machine causes interference on Telatalk and Inter-Office broadcasting systems.

Note: In the diagram below the black and yellow condenser wires are connected to No. 5 Post and the red condenser wire to No. 4 Post.



May 1, 1939

Section 1

REVIEW QUESTIONS

1. Is it possible to use the Writing Machine in case the switch is broken?
2. What method is advised to fasten on a switch knob?
3. What is the clearance recommended between the brush holder and the governor face?
4. What is the frequency range on a.c.motors?
5. What is the purpose of each condenser?
6. How would a service man tell whether or not a resistor was working?
7. Is it possible to use the new style governor on all style motors?
8. What is the difference between the different governor brushes?
9. How much play should there be in the armature shaft?
10. How does the governor control the speed of the motor?
11. What would you check if you found the governor points badly pitted or worn?
12. What material is used to clean the governor face and armature?
13. How can a short be removed from a d.c.motor?
14. What is the difference between the a.c. and d.c.governors?
15. How can the impressinn arm on the Westinghouse be tightened?
16. What is the cost approx. to run the motor for electricity per day?
17. If the motor coupling did not line up, how can it be corrected?
18. Name the reasons why a motor should heat up?
19. What would be the indication that a 110V motor running on 220V?
20. What would be the indication that a 220 V motor was running on 110 V?
21. How often should a motor be lubricated?

WORM DRIVE

The worm drive and clutch assembly are to provide speed reduction between the motor and the power roll; to return the carriage and index the platen.

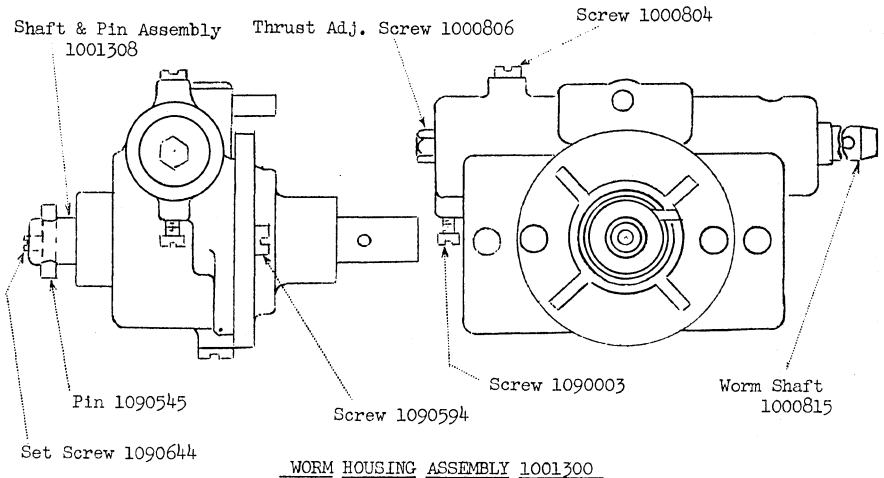
The worm shaft is connected to the motor by a coupling which is held in place by two cotter pins. The worm gear drives the power roll through a pin which engages a slot in the end of the roll. The carriage return tape pulley and friction drive disc, for engaging the pulley to return the carriage, are mounted on the clutch drive shaft.

ADJUSTMENTS (Worm End Play) Loosen the set screw 1090003 and turn the adjusting screw 1000806 until all end play is eliminated; then turn the screw back 1/4th of a turn.

LUBRICATION The housing is packed at the factory with E.W.M. Non-Fluid oil. It should be necessary to repack the housing only when overhauling the machine. Make sure there is grease between the thrust screw 1000806 and the end of the worm gear.
DO NOT USE ORDINARY GREASE.

GEAR REDUCTION PARTS

- (1) On machines equipped with Electromatic motors the gear reduction is 17-1.
- (2) On machines equipped with General Electric Motors, serial numbers 20,000 to 22,999, the reduction ratio is 11-1.
- (3) On machines 23,000 serial number and above the reduction is 11-1 but parts are not inter-changeable with units used below 23,000.



May 1, 1939

POWER ROLL

THE PURPOSE is to drive the cam units.

The roller turns continuously when the power is on and the serrated surfaces of the cams, when they are tripped by the operation of the various key levers, engage the rubber surface.

When the cam is allowed to engage the roll, the cam turns around to operate the cam unit, which in turn operates the mechanism to which it is connected.

Note: Friction and slippage result in wear. The cam does not slip on rubber, the cam is pushed away from the rubber roll to move the cam unit. The knurl gears itself into the rubber roll.

LUBRICATION The power roller is filled three-fourths full of High Temperature grease at the factory and this grease ordinarily provides all the lubrication necessary without any further attention. If the power roll develops a squeak or rumble, soak roller washer 1090649 in oil.

See that shaft turns freely, and when roll is in place in machine adjust screw 1090024 to take up all end play, then tighten lock nut 1090041.

The cover of the roll is made of highest grade rubber, which will last indefinitely in normal service. If the roll does become scarred, or worn because of improper setting of the cams, or becomes hard through lack of use over an extended period the roll should be replaced.

If the power roll "runs out" or "wobbles" after it has been replaced, turn it around 1/2 revolution. The power roll must run true for good print work.

The following power rolls are used in the Electric Writing Machines:

- (1) All machines under the 20,000 series - - - - #1000650
Knurled ring on the shift end.
- (2) All machines from 20,000 to 23,000 - - - - #1000649
- (3) All machines from 23,000 and up - - - - -#1001328
- (4) Carbon ribbon attachment - - - - - - - - # 1012686
Special left hand bearing for drive pulley.
- (5) Hektowriter - - - - - - - - - - - - - #1013234

March 2, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #65

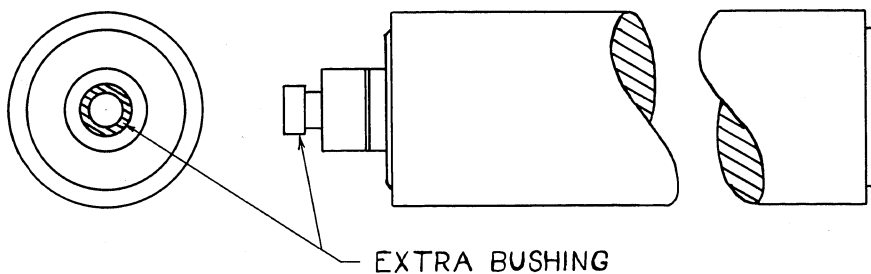
TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS

SUBJECT: POWER ROLL SHAFT

A bushing is being pressed on the end of the power roll shaft of a few machines with serial numbers above 65850, now being sent to the field.

This bushing is added because the boss or projection holding the power roll shaft to the left side of the machine was made too large to fit our regular power roll shaft.

POWER ROLL



IMPORTANT: When replacing a power roll, on one of these machines, do not replace the power roll shaft.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

REVIEW QUESTIONS

1. What grease is used in the clutch housing?
2. How much play should there be between the thrust screw and the worm shaft?
3. How much is the speed reduced on the 20,000 series machines?
4. How can the ratio be determined, if no marking is noticed?
5. How often should the power roll bearing be lubricated?
6. What would be the printing results from an eccentric power roll?
7. What is the life of the average power roll?
8. What is the adjustment on the left hand side of the power roll bearing?

KEY LEVERS

The purpose of the key levers is to control the different cam units which in turn operate the various functions of the machine as outlined under cam units.

They are mounted on key lever bearing wire 1000502 and are guided by front guide comb 1000070 and by slot in chasis frame. They are normally held against the top of the slot in front guide comb by springs 1090273 and adjusting screws 1090272. Their lower ends which are forked, engage the release levers on the various cam units. They must move freely and have the proper tension, to insure uniform touch.

ADJUSTMENT Place a $2\frac{1}{2}$ oz. weight on the key, and with the correct tension this weight will be just sufficient to trip the cam without carrying the key lever all the way to the bottom of the guide comb slot.

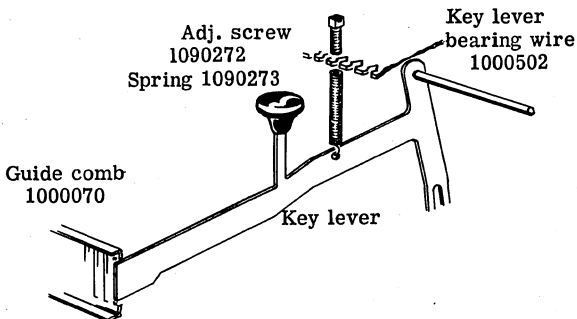
If the weight does not trip the key, there is too much tension. If the key lever bottoms in the slot, there is not enough tension. Raise spring screw 1090272 with pliers and turn with screw driver to adjust.

Any binds which appear to be in the key lever action are usually in the cam unit. If this condition is not readily corrected, install a new cam unit.

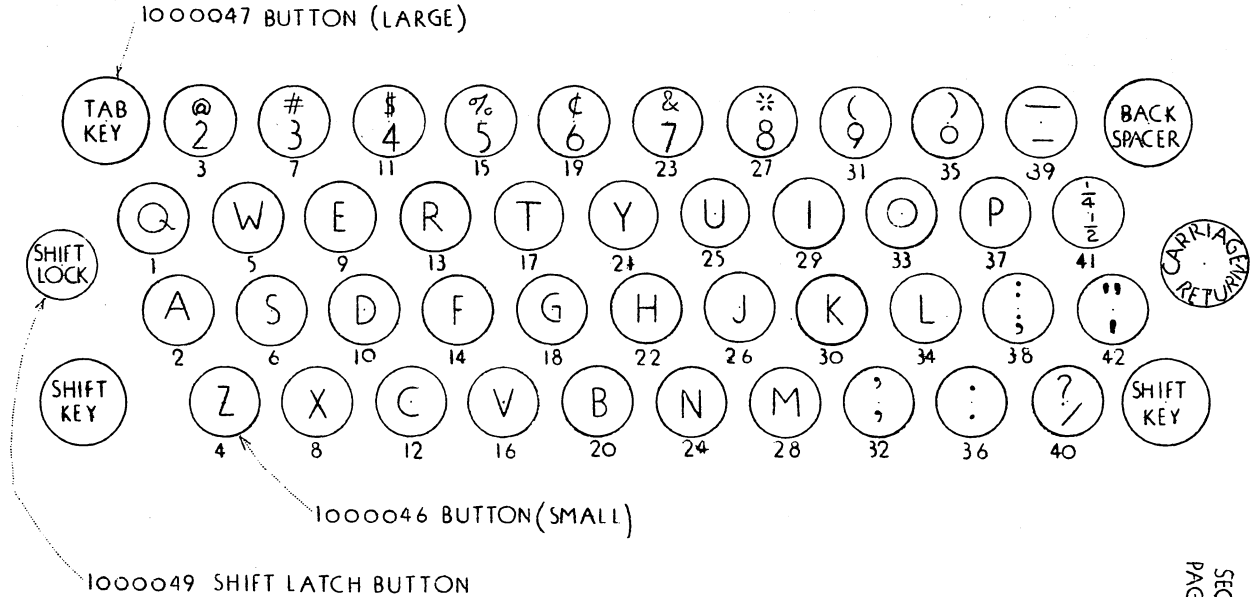
After a little practice, any variation in key tension is readily detected by touch. If operator misses letters, the usual cause is heavy spring tension on the keys of the letters missed.

The front guide comb 1000070 is properly set at the factory and ordinarily needs no further adjustment. The correct setting for the front guide comb is such that the key levers will still have approximately $1/64$ inch to travel after they released the cams.

The front guide comb can be raised or lowered by the screws which hold the comb on each side, but this adjustment should not be disturbed unless absolutely necessary.



KEYBOARD CHART



REMOVAL

- (1) Take the power frame assembly out of base.
- (2) Remove the cam unit.
- (3) Push 1000502 wire through until key lever is free and it will come out through the front of the machine.

CAUTION Unless pressure is kept against wire 1000502 with another, other key levers and bell cranks will drop out of their places and make the task unnecessarily hard. Make sure the bell crank is on the left side of the key lever when replacing it.

BAKELITE KEY BUTTONS Due to the difference in color of key buttons on old and new style machines, it is necessary to specifically state the color of the buttons desired when ordering for service.

CELLULOID KEY BUTTONS On the later machines, celluloid buttons are used instead of the bakelite. The key buttons have a glossy appearance and the operating buttons are lighter in color.

It is impossible to use the key button filler on the celluloid buttons.

Keep all open flames away from celluloid key buttons.

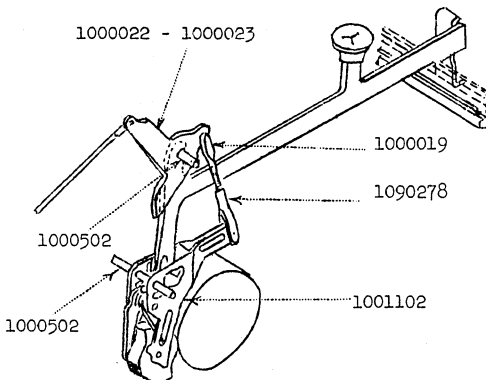
KEY BUTTON FILLER The white key button filler is a high grade, hard drying lacquer which is purchased from the button manufacturer. This filler can be replaced by following this procedure:

- (1) Clean the old filler from the key button.
- (2) Put a drop of the lacquer on the key button.
- (3) Allow the lacquer to dry 30 to 60 seconds.
- (4) Wipe the button lightly with a cloth to remove the excess lacquer.
- (5) Let the lacquer dry for ten minutes.
- (6) Polish with a cloth dampened in alcohol.

REMOVAL The key buttons are pressed on the key levers and can be removed by prying up on the buttons or by pushing them off from the underside. Use a tool with a deep narrow slot in it. When installing new buttons, place a "T" bender under key lever and push button on by using screw driver handle.

CAM UNITS

The cam units are mounted in two parallel rows on either side of the power roll. Each cam is normally held out of engagement with the roll by the release lever, the upper end of release lever being forked by the key lever. When a key is depressed, this release lever lug moves out of engagement with the cam lug. The spring finger on the opposite side of the cam rotates the cam so the serrated face contacts with the power roll, and the power roll rotates the cam one half or a full revolution, depending on its kind. As the cam is thus rotated and its lobe comes around against the roller, the entire cam unit is forced to swing back on its bearing pin. In doing so it pulls down the connecting link and operates the type bar or other mechanism to which it is connected. The lug on the cam then engages the second lug on the release lever this second lug being immediately above or below the first lug mentioned, where the cam rests until the key is raised. This second lug on the release lever prevents repetitions. When a key is raised, the cam and the release lever assume their original position.



DO NOT OIL CAMS UNLESS ABSOLUTELY NECESSARY. Oil must never be allowed to get on the power roll as it will rot the rubber and cause it to swell.

Should it ever be necessary, oil may be applied very sparingly to the cam unit bearing points. The best way to do this is to get a small drop of oil on the end of a small wire and place this oil in the exact spot desired. NEVER use an oil can to oil cam units.

May 1, 1939

Two-lobe Cam Units (front) 1001101 are controlled by two front rows of key levers for operating their respective type bars and also by space bar for operating escapement independently of type bars.

Two-lobe Cam Units (rear) 1001102 are controlled by two rear rows of key levers for operating their respective type bars.

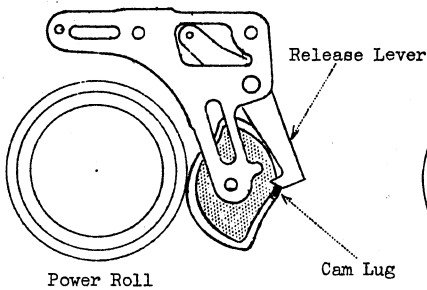
Single-lobe Cam Unit (front) 1001103 is controlled by carriage return key and operates clutch toggle lever for returning carriage and indexing platen.

Single-lobe Cam Units (rear) 1001104 are controlled by back space key and tabular key for operating their respective units.

Shift Cam Unit 1001105 is mounted on the front side of roll and is controlled by shift key and operates mechanism to shift type segment for upper or lower case.

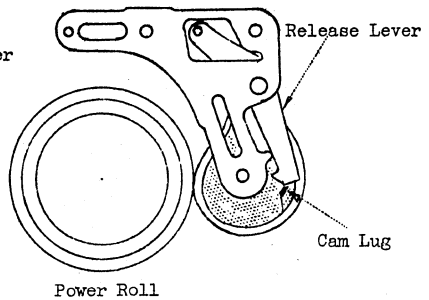
DOUBLE LOBE CAM

Fig. 1



SINGLE LOBE CAM

Fig. 2



SERVICE If cam sticks, check release lever and spring finger to see that they are not binding the cam. If this condition is not readily corrected with pliers, install a new cam unit.

In case the cam itself is sluggish, brush or blow out the dirt. Brush dirt out of cams each time machine is serviced. This requires only a few minutes and may save a future service call.

If the cam is gummed up so that it cannot be freed by brushing out the dirt, the whole cam unit may be washed in gasoline, as a last resort. The disadvantage of

the gasoline is that it washes out the oil in the bearings. After drying, oil carefully as outlined above.

Heavy tension on the key lever spring may result in the release lever lug binding the cam.

ADJUSTMENT The double lobe cam units should be set so that when the cams are in normal position their faces come as close to the roller as possible without touching it. This clearance should be checked between each lobe of the cam and the roller as follows:

The cam units are set in relation to the power roll by means of the adjusting links 1090278. When they are properly adjusted the release levers of the double lobe cams should rest on the back edge on the lugs of the cams, Fig. 1, or just strike the back edge and slip off when the cams are released and resting against the roller.

The release levers of the single lobe cams should fall behind the lugs of the cams, Fig. 2. This should be tried with the motor not running.

To obtain the proper setting of a cam, proceed as follows:

- (1) Remove the power roller.
- (2) Hold the type bar against the cylinder.
- (3) Disconnect the adjusting link from the cam unit using spreading pliers.
- (4) When the link is disconnected, turning it to the right brings the cam closer to the roller, and to the left moves it away.

Check both lobes of cam on roll. If there is enough difference in the setting to cause a noticeable difference in the printing, replace the cam unit.

REMOVAL

- (1) Loosen 3 screws 1090010 which hold cam bearing clamp plate in place.
- (2) Push an extra cam bearing wire 1000502 through hole in side frame of machine against the end of the cam bearing wire in the machine, and continue pushing the extra wire until the joint between the two wires is opposite the cam unit which is to be removed.
- (3) The wire which was in the machine will now project from the opposite side of the machine. Pull the two wires apart a short distance and the cam unit will fall out of its place when its adjusting link is unhooked.

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When the new cam is replaced and cam bearing wire is back in place, be sure to screw the cam bearing plate screws down tight.

If the tail or the part where the fork of the key lever engages the cam unit is bent, so that the end extends through the frame, (a) Fig. 3, the adjacent cam when being operated will run against the end of the release lever, sometimes moving it enough to release the cam. Consequently the character which it operates will print immediately after the first key.

Also a bent lug "a" in Figure 3 below causes a cam to release at a different point .

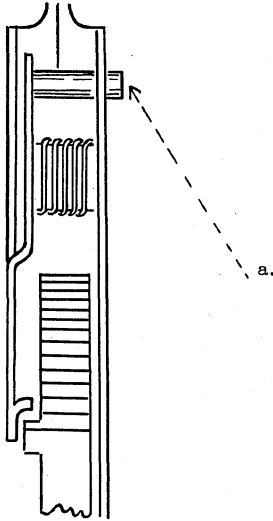
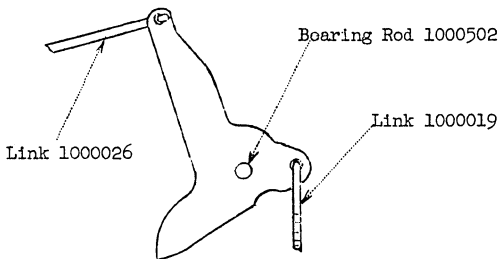


Fig. 3

BELL CRANKS

THE PURPOSE of the bell cranks is to transfer motion from cam unit to type bar and to operate ribbon lift and ribbon feed mechanisms.

Bell cranks are mounted on same bearing wire 1000502 as the key levers. The front end is connected by link 1000019 and adjusting link 1090278 to cam unit. The upper end is connected by link 1000026 to type bar toggle lever 1000028. The rear extension rests under the ribbon lift bar assembly 1000084 and rocks the ribbon lift bar on its fulcrum stud at each operation of the bell crank.



Apply oil sparingly where links are connected to bell cranks and at bearing 1000502 when overhauling.

ADJUSTMENT This should not be necessary and should never be attempted except as a last resort.

Bell cranks are hardened and tempered and consequently break easily. Never bend or adjust bell cranks unless absolutely necessary.

A bind in the type bar assembly may appear to be in bell crank. Check type bar assembly carefully before attempting to adjust bell cranks.

REMOVAL

- (1) Take power frame out of base.
- (2) Remove the type bar actuated by the bell crank.
- (3) Remove the cam unit and adjusting link.

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- (4) Unhook the key lever tension spring, also 3 or 4 additional springs on each side.
- (5) Push 1000502 wire through until the bell crank is free and drops down. It will come out through the front of the machine between the key levers and the key lever tension spring holder.

CAUTION Unless pressure is kept against wire 1000502 with another, other bell cranks and key levers will drop out of their places and make the task unnecessarily hard. Make sure the key lever is on the right side of the bell crank when replaced.

GROUPING OF CHARACTERS Each bell crank is designed to actuate the type bar either heavily or lightly depending upon the size of the printing area of the type so the large characters will print with the same density as the small ones.

For example: The "W" has four printing lines and the "I" only one, thus the "W" type bar must strike a heavier blow than the "I".

It is not possible to have a small printing character and a large printing character operate uniformly if they are placed on the same type.

All the characters on the extreme right side of the keyboard are operated by light throwing bell cranks because the type faces have small printing areas.

Should a customer wish to have a large character replace a small one, it would mean the replacing or installing of a special bell crank as well as the type bar, because the original bell crank would not actuate the type bar with great enough impulse to print the character uniformly with the others.

The same holds true if a small face character were transferred to a heavy printing position, the character would strike too heavily.

REVIEW QUESTIONS

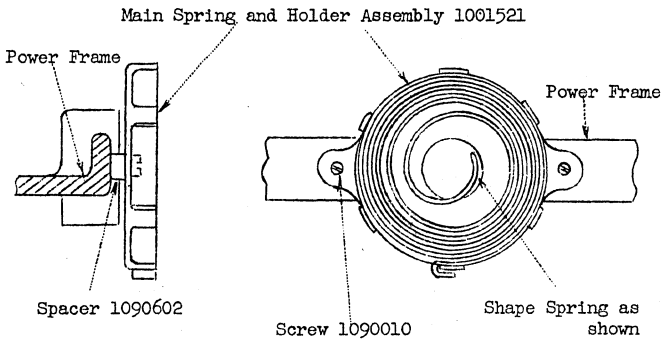
1. How much tension is on the key lever spring?
2. What is the purpose of the front guide comb?
3. How much travel should there be in the key lever after the cam is released?
4. How can a service man determine whether a bind is in the key lever or cam?
5. What keys are considered to be the "home keys" in typing?
6. How are the key buttons fastened to the key levers?
7. What method is recommended for removing and installing new ones?
8. How many cams are operated off the power roll?
9. What is the correct adjustment for the letter cams?
10. What is the correct adjustment for the operating cams?
11. What are the effects of a bent release lug?
12. How far does the cam carry the type bar?
13. What is the purpose of the bell crank?
14. How is the difference in blow governed by the bell crank?
15. Why is the Electric Writing Machine Keyboard different than the manual machine?

MAIN SPRING AND HOLDER

THE PURPOSE of the main spring is to draw the carriage to the left through the tension tape 1000396 which is fastened to the right end of the carriage frame. For the correct tension on the main spring (see Carriage).

REMOVAL Remove the condenser and resistor assembly. It is not necessary to disconnect the wiring. Disconnect the carriage tension tape fastened to the main spring drum. By removing the stud 1090603 the friction governor assembly can be removed.

Remove the two screws 1090010 which hold the main spring holder to the frame of the machine.



REPLACEMENT The main spring is sent from the factory wound in the holder and should not be removed from the holder. If it is necessary to place a main spring in a holder, lay the holder on a bench, hook the bent end of the spring over an arm of the holder and wind the spring in a counter-clockwise direction, starting from the outside and wind towards the center.

The inner end of the spring should be shaped as shown, so the hook on the inside of the friction governor assembly will catch in it when turned counter-clockwise. Do this before mounting the spring and holder assembly to the rear of the power frame.

EWM CUSTOMER SERVICE DEPARTMENT

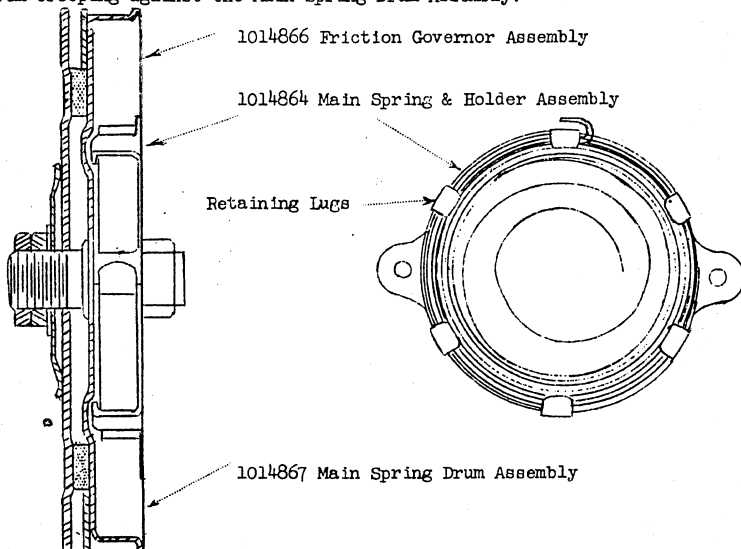
LETTER OF INSTRUCTION #18

TO: ALL CUSTOMER SERVICEMEN

SUBJECT: FRICTION GOVERNOR ASSEMBLY

To reduce friction and give a faster and smoother running carriage, an improvement has been made on the #1001521 Main Spring and Holder Assembly.

It is the adding of retaining lugs (Figure #1) to hold the main spring from creeping against the Main Spring Drum Assembly.



<u>PART NO.</u>	<u>NAME</u>	<u>PRICE</u>
1014864	Main Spring and Holder Assembly	\$1.40
1014866	Friction Governor Assembly	3.50
1014867	Main Spring Drum Assembly	.90

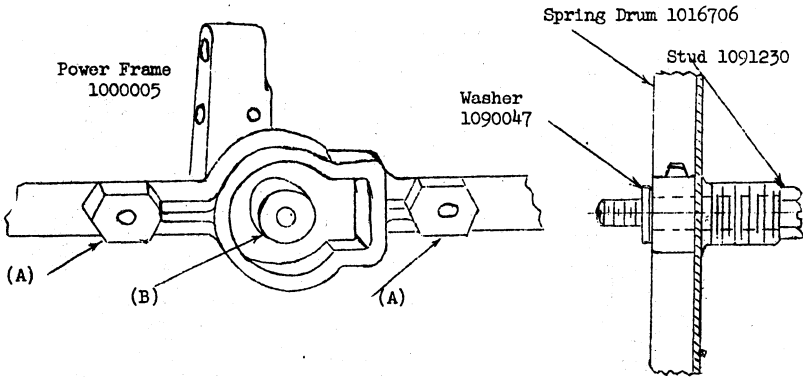
#1014864 Main Spring and Holder Assembly is not interchangeable with the former style #1001521 used. However, #1001521 will be carried in the Service Department parts stock.

January 11, 1940

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #43

TO: ALL EWM SERVICEMEN, AND IBM SERVICE SUPERVISORS
SUBJECT: CHANGE IN POWER FRAME AND SPRING DRUM

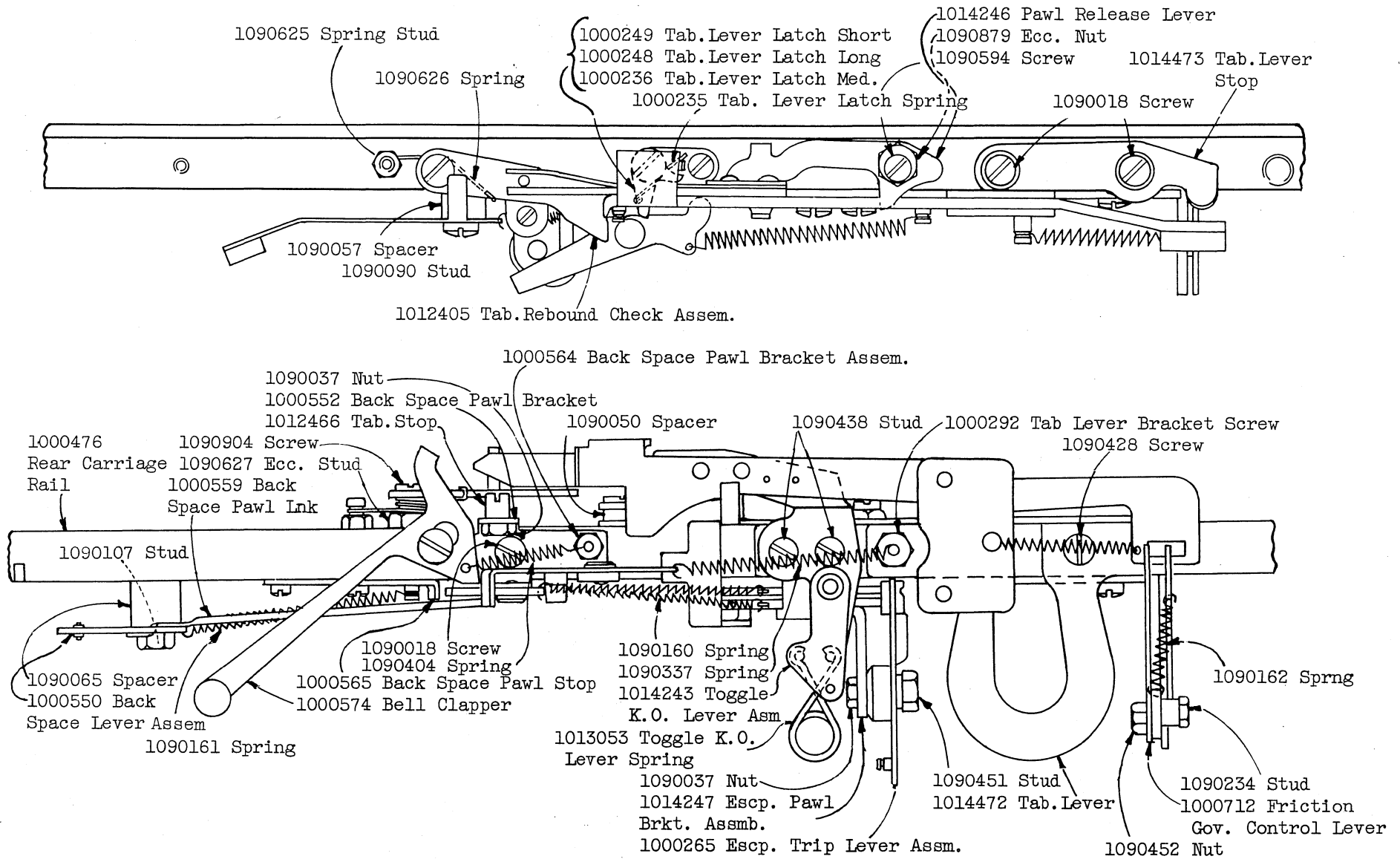
The power frame has been changed as shown at Fig. A and B in the drawing below. Adding the bosses at "A" provides more threads in the casting to fasten the main spring assembly and eliminates the use of the spacers. No change has been made in the main spring assembly.



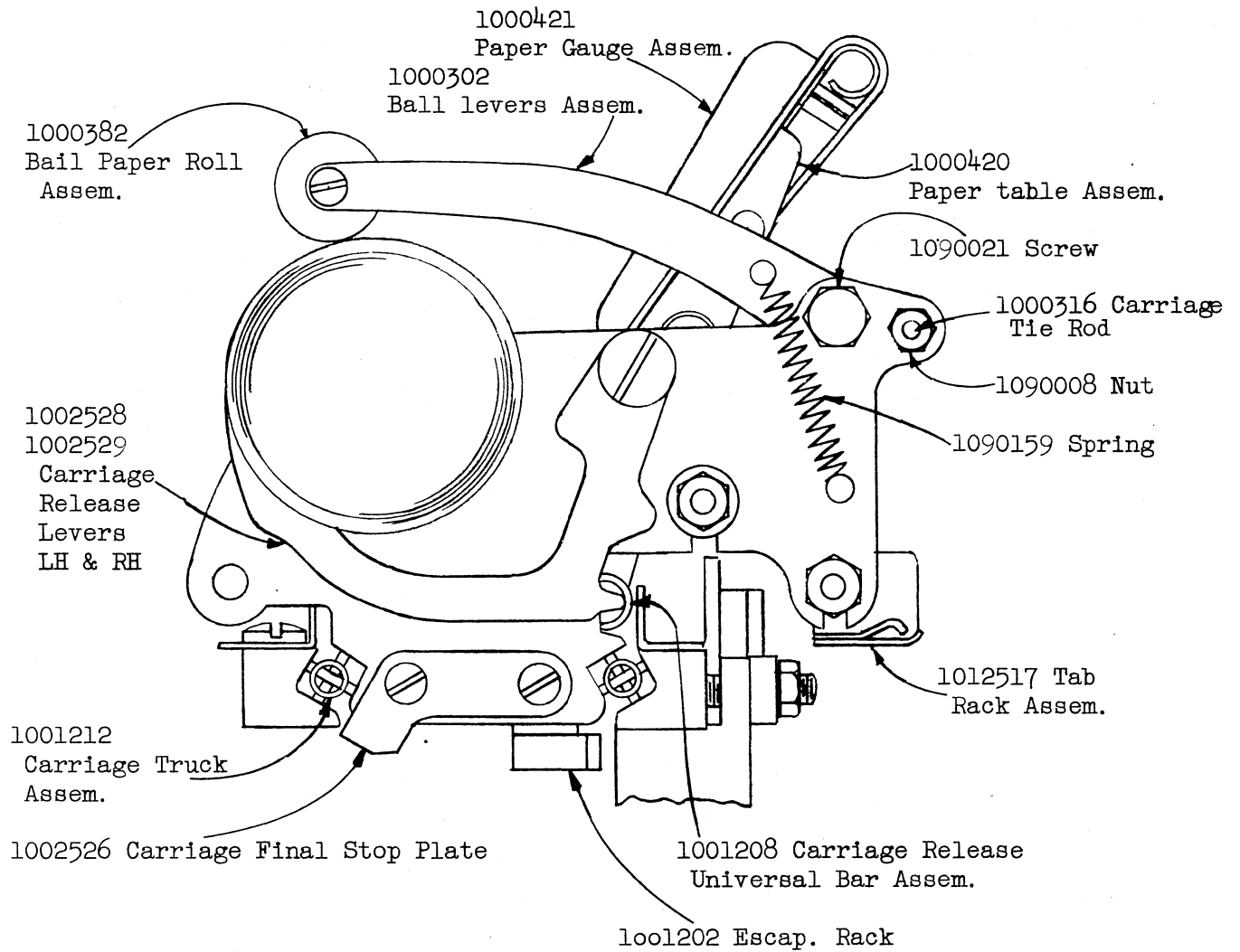
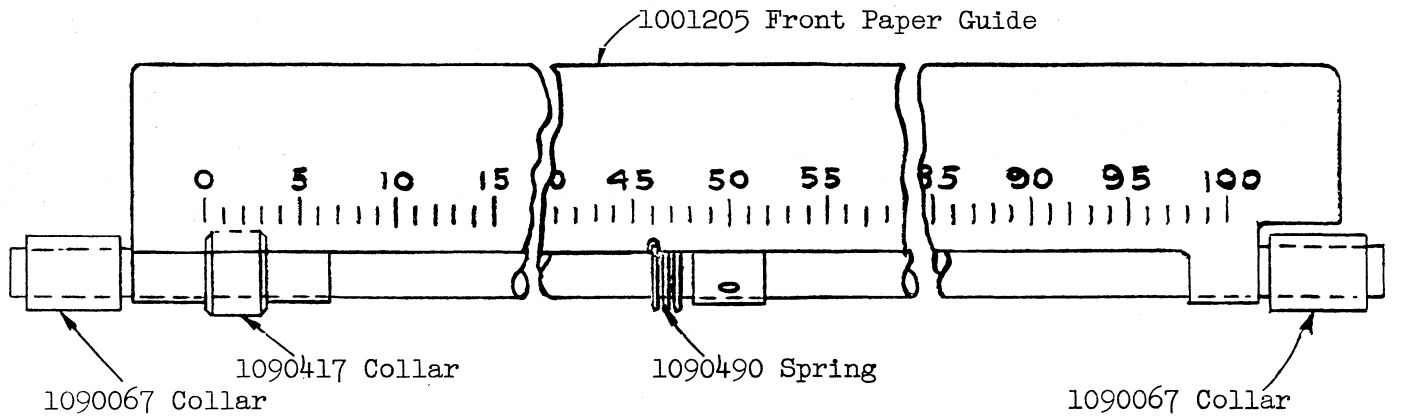
The boss added at Fig. B, due to the better relation of forces relieves strain on the stud #1091230 and results in a smoother acting spring drum. The spring drum #1016706 is different from the #1001515 in that the hub is shorter to allow for the boss added at Fig. B. The stud #1091230 is shorter than the stud used before the change was made.

Power Frame #1000005
Spring Drum #1016706
Stud #1091230

February 18, 1941



APRIL 1 1939



APRIL 1 1939

Assemble the spring and holder assembly to the rear of the frame. It must be held away from the frame by the two spacers 1090602. Put the stud in place in the friction governor assembly and place the washer 1090047 on the end of the stud. Put the drum and stud in place and turn the drum until the hook catches in the spring before starting the stud.

Make sure the governor assembly turns freely before connecting the carriage tension tape. There are two holes in the side of the spring drum for attaching the tape. The spring drum must be wound by hand. Wind the spring drum until there is a sufficient tension to pull the carriage. (see Carriage).

In case the spring drum should bind, remove the friction governor plate 1000711 and reposition the main spring holder by loosening the two screw 1090010 and shifting the spring holder away from the stud 1090603.

CARRIAGE

The carriage is mounted on ground carriage rails and travels on four roller bearings held in tubular containers called trucks. The rollers are spaced as widely as the carriage travel will permit. The trucks are of different length for different length carriages.

The carriage is drawn to the left by the main spring through the tension tape which is fastened to the right end of the carriage frame.

REMOVAL

- (1) Disconnect the carriage return and tension tapes.
- (2) Loosen the rear rail adjusting screws.
- (3) Loosen the rear rail clamping screws and remove the left one (do not disturb the front rail and dust cover.)
- (4) With the rear rail pushed back as far as possible and the carriage in a central position, use a long rod or "T" bending tool and push the rear truck out at the left.
- (5) Lift the carriage out vertically.

REPLACEMENT

- (1) Lower the carriage vertically into place between the rails being sure that the carriage release universal bar on the back of the carriage is in front of the pawl release lever on the rear rail and that the escapement pawls are clear of the rack.
- (2) Insert the front truck first and then the rear truck from the left side, holding the gear to the left. Press the left end of the rear rail forward. On the older style machines, the small gear is in the center of the small truck.
- (3) Move the carriage to the extreme left (using margin release lever) and position the trucks so the ends are flush with the left end of the rails. Move the carriage to the extreme right and check the truck position there.

May 1, 1939

- (4) Turn down the rear rail clamping screws to hold the rail loosely.
- (5) Shift the carriage so the rollers on each end of the truck are in line with the adjusting screws then remove all play from the carriage and yet have perfect freedom of movement. Disengage the escapement pawls from the rack by inserting something between the pawl release lever and the rear rail. Move the carriage very slowly.

Lock adjusting screws and tighten rear rail screws.

- (6) Fasten the carriage tension and return tapes in place. Carry the return tape over the small pulley on the left end of the carriage which operates the line spacing device.
- (7) Test the tension on the carriage main spring for correct pull by hooking a scale to the paper bail arm and pulling the carriage from the left to the right side. The correct tension is given below.

ADJUST CARRIAGE TENSION AS FOLLOWS

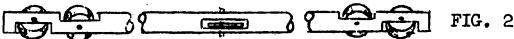
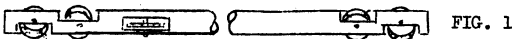
12" - Start at 2 lbs.	Finish at not over 2-1/2 lbs.
16" - Start at 2 lbs.	Finish at not over 3-1/4 lbs.
20" - Start at 2 lbs.	Finish at not over 3-1/4 lbs.
24" - Start at 2 lbs.	Finish at not over 3-1/2 lbs.
30" - Start at 2 lbs.	Finish at not over 3-1/2 lbs.

The style of truck (gear to left of center) shown in Fig. 1 is used as

- (a) Rear truck in all machines.
- (b) Front and Rear in machine 10700 and up.

The style of truck (gear in center) shown in Fig. 2 is used as:

- (a) Front truck up to 10700 series.



ELITE AND PICA PARTS: Elite spacing is 12 characters to the inch. Pica spacing is 10 characters to the inch. For this reason certain parts of the two machines are not interchangeable. These parts are listed below:

Carriage Parts: Escapement Rack Card Holder
 Front Scale Margin Rack and Stops
 Tabular Rack

Rear Rail Parts: Escapement Pawls and Back Space Pawl

May 1, 1939

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #7-B

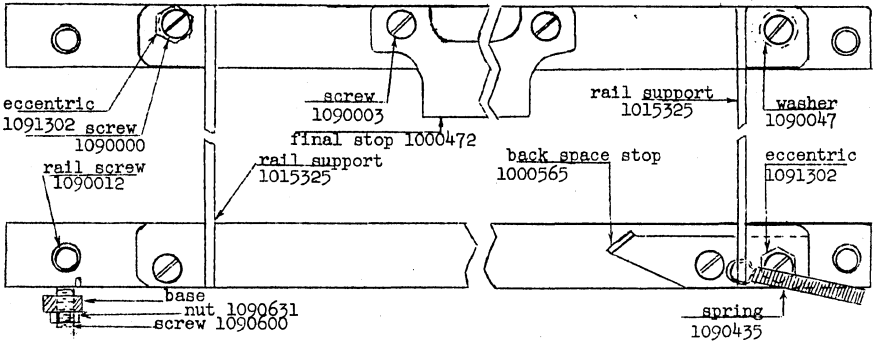
TO: ALL EWM SALES AGENTS, PROVINCIAL MEN AND SERVICEMEN

SUBJECT: CARRIAGES MOUNTED ON TRUCKS WITH LUCITE ROLLERS AND CENTER SUPPORTS

Refer to Letter of Instruction #7. The center support brackets #1015325 have been changed so that an eccentric stud #1090879 could be added. The new parts simplify the carriage adjustment and should be installed wherever necessary.

It will be necessary to follow the same procedure used in Letter of Instruction #7. In addition, check the following:

1. Care should be taken when inserting the trucks in place. Each Lucite roller should be free to turn.
2. Have the two screws #1090012 out of rear rail until the trucks are centralized.
3. The eccentric nuts #1091302 should be set to have the rails far apart.
4. Install the two screws #1090012, but do not tighten. Adjust the two screws #1090600 to remove all side movement of carriage.
5. Centralize the carriage to locate the Lucite rollers in line with the eccentric nuts #1091302, which are adjusted to tighten the center section of the rail.
6. The screws holding the brackets #1015325 should be set-up tightly, then check the carriage at different points.



When a service call is made, each serviceman should clean the carriage and rails and tighten all carriages that have any side play.

Credit will be allowed on parts returned which should be listed on the warranty sheet.

January 27, 1941

January 19, 1942

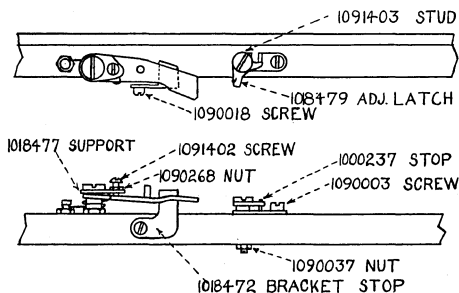
LETTER OF INSTRUCTION #63

TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING SUPERVISORS, AND
EWM CUSTOMER ENGINEERS

SUBJECT: RECENT CHANGES IN REAR RAIL

Below is a drawing showing a section of rear rail with all parts removed except those which have undergone the following recent changes:

- (1) A support is mounted on the rebound check stud with a set screw and lock nut arrangement to adjust the rebound check lever for height.
- (2) A stop bracket, #1018472, is mounted on the backspace pawl bracket and extends over the rail to form a stop. This is designed to prevent the rebound check and the tabular lever bracket tip from becoming disengaged.



- (3) An adjustable tabular lever latch assembly with an eccentric stud, #1091403, extends through the rail and locks with nut #1090037. This eliminates changing the latch when a different size is needed. It may be necessary to bend the latch stop lip slightly to the right of the machine.

Nut #1090037 must be tightened after each adjustment of the latch.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

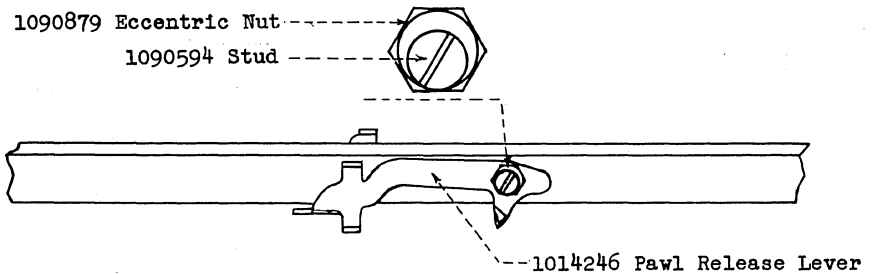
March 2, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #66

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER
ENGINEERS

SUBJECT: PAWL RELEASE LEVER ADJUSTMENT

When adjusting a pawl release lever equipped with the eccentric nut and stud, be sure that the final adjustment leaves the eccentric nut toward the front of the machine.



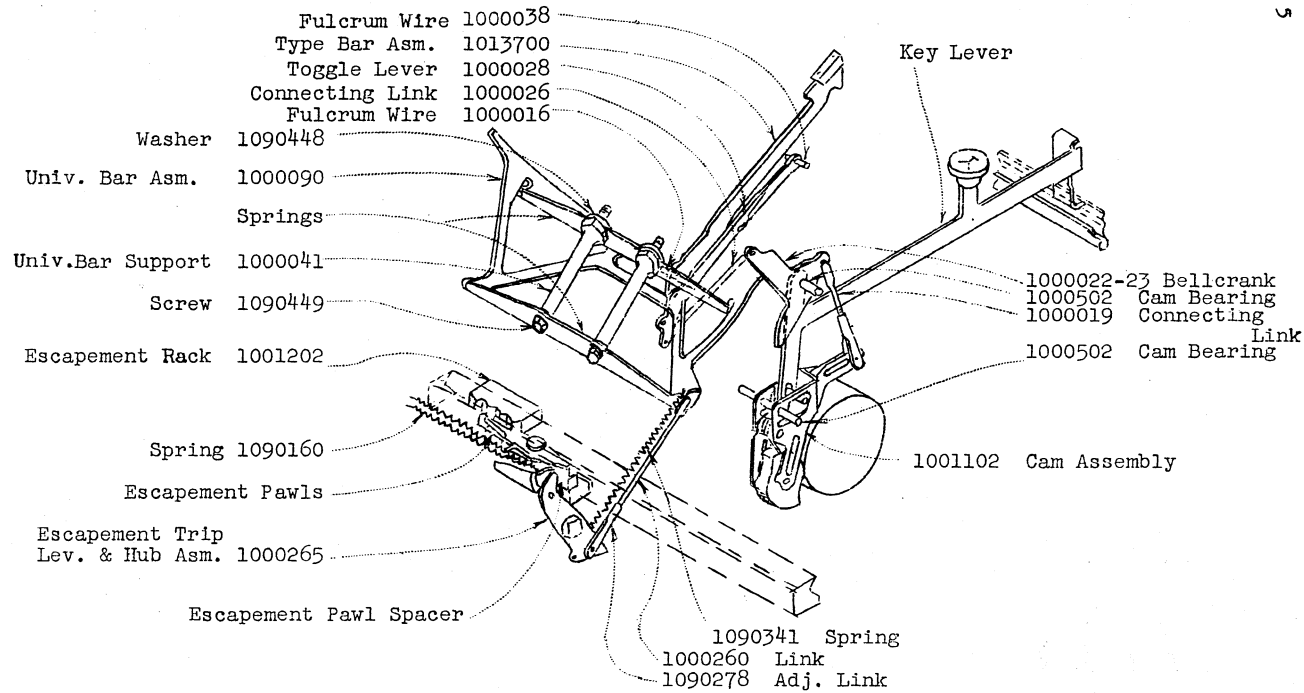
Failure to observe this rule will result in a faulty left margin and slow line spacing.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

REVIEW QUESTIONS

1. How long a writing line does the standard 12" machine have?
2. What should be checked to remove a bind in the carriage?
3. What typing effects will the above bind cause?
4. How are the rails adjusted?
5. Why do some machines have a shim under the the rail assembly?
6. What care should be taken when installing a main spring holder?
7. In which direction is the main spring wound?
8. Which side of the machine, should the trucks be installed?
9. How much tension should the main spring have on a 12" machine when at the extreme left side?



TYPE BAR ASSEMBLY

Type bars are numbered from 1 to 42 (beginning on the left hand side of the segment) and are fulcrumed on #1000016 type bar fulcrum wire in segment.

The type bar can be operated only by a pull on the bell crank and not by lifting up on the outer end of the type bar because of this toggle linkage. The toggle linkage is for the purpose of preventing rebound and collision of type bars and also permitting faster operation.

Apply oil to the bearing points sparingly.

REMOVAL

- (1) Shift the type basket to the small letter position. Unhook from the spring plate the spring of type bar to be removed.
- (2) Loosen fulcrum wire stop screws in segment support.
- (3) Insert wire 1000016 in side of segment from which bars are to be removed, forcing out fulcrum wire so that bar is on the inserted wire. Back up wire so that only bar that is to be removed and next 5 adjacent bars drop from segment.
- (4) Loosen clamp plate screws about 1/2 turn, just enough so wire can be moved in groove.
- (5) Insert wire 1000038 in groove and force fulcrum wire around until bar to be removed is on inserted wire. Back up inserted wire so that only toggle link connecting the bar to be removed drops.
- (6) With spring hook under front end of toggle lever, pull up until it is against type bar which is held in left hand, push down on back end of bar, turn to right or left depending upon which side of segment bar is to be removed from, and pull forward on bar. This brings bar assembly with link still attached to the front of the segment and up between type bars. The type bar is then easily unhooked from link.
- (7) Oil bearings on new bar, hook on link, drop toggle link between type bars with spring hook, insert new bar in the reverse manner from which it was removed.
- (8) Push fulcrum wire through toggle links and tighten clamp screws.
- (9) Push fulcrum wire through type bars and tighten stop screws.

May 1, 1939

CAUSES FOR TYPE BARS NOT LOCKING IN THE BASKET

- (1) The cam adjusted too close to power roll.
- (2) A bind in the toggle mechanism 1000028.
- (3) The felt under the type heads may be too thick.
- (4) If one side of the segment is not locking, place a shim made of paper between basket and segment.

TYPE BARS REBOUNDING (CAUSING COLLIDING OF BARS OR DOUBLE PRINTING)

Build up the felt pad under the type heads. This can be done by using a section of a felt. Increase this thickness until there is only a small play when the bars are locked down.

Between No. 21 and No. 22 bars, there is a segment spacer link No. 1000092. By bringing the two prongs closer together, it will eliminate excessive rebounding. Also vice versa will allow the center bars to lock.

NOTE: If the type rest felt becomes worn, some type bars may lie in the type basket too low and when the cam unit is released the bar is held back for a second by a buckled toggle; when the toggle finally lets go, the type bar goes to the paper at a higher rate of speed than it normally would.

In many cases uneven printing is not due to poor type alignment - but worn type rest felts.

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #20

TO: ALL CUSTOMER SERVICEMEN

SUBJECT: NEW DESIGN OF:
TYPE GUIDE
TYPE SEGMENT
TYPE BARS
TYPE SEGMENT WIRE

To improve our products further, the type segment, guide, and type bar have been re-designed. The changes are herein listed and explained - READ and STUDY them carefully.

Elliptical Ring Type Guide

The new style type guide can be used only with the new segment and new type bars.

The purpose of this guide is to produce better alignment and a longer wearing ring. The elliptical ring gives the outside bars the same alignment characteristics as the center bars.

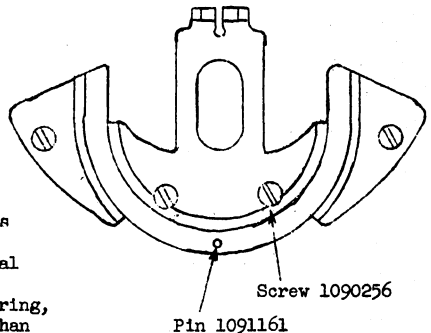
Adjustments:

The Ring and Cylinder adjustment is made in the same manner as before but is very critical on the outside bars. To obtain the full benefit of the elliptical ring make this adjustment carefully. The outside bars, when they strike the ring, make a more pronounced metallic sound than the center bars. This is inherent and the type alignment will be destroyed if the end bars are bent or mauled to eliminate this sound.

Centering the Guide:

Another advantage of the elliptical guide is the ease with which it can be centered. Should it be necessary to center the guide, loosen the four screws until the guide is held firmly but can be moved slightly by being tapped. Follow the procedure for gauging the exact center described in the service manual, Sec. 20, pages 1 & 2. The guide will pivot around the pin #1091161 enough to allow for centering. Then tighten the four screws securely.

TYPE BAR GUIDE 1015348



February 29, 1940

Elliptical Ring Type Segment.

The type ring or anvil has been removed from the new segment. Hence it can only be used with the new type guide. The new segment is more strongly reinforced between the segments. This is to allow the new style segment wire to be tightened without closing the segments on the type bars with a normal tension on the segment wire.

Only the new style segment wire can be used with the new segment.

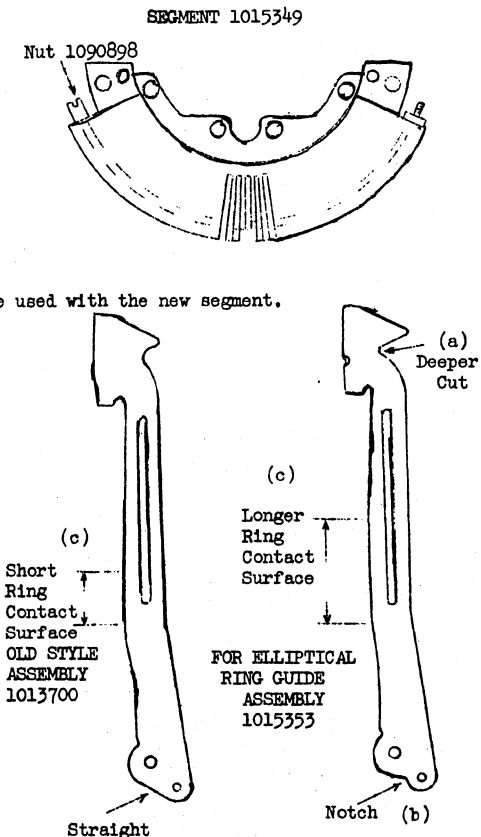
Type Bars for Elliptical Segment.

The new style bars are for use with the new segment and guide but also can be used with the old segment and guide. However, old style bars cannot be used with the new segment and guide.

The new bars can be distinguished by deeper cut shown at (a), by the clearance notch at (b) and by the longer ring contact surface at (c).

All type bars now being furnished for service are new style. These can be used with either the new or old segment and guide assembly.

Old style bars can be used only with the old segment and guide assembly.



Starting with machine #40820, the type segment and segment wire have been changed to facilitate service and assembly. The segment and segment wire described in letter #20 have been discontinued; this is the type of segment in which the wire is held in place by a nut at each end. The same type bars and elliptical ring are used with either style of segment and wire.

The new segment slot and segment wire are the same as our original design. Two screws in the type basket casting act as stops for the wire, the same as originally used.

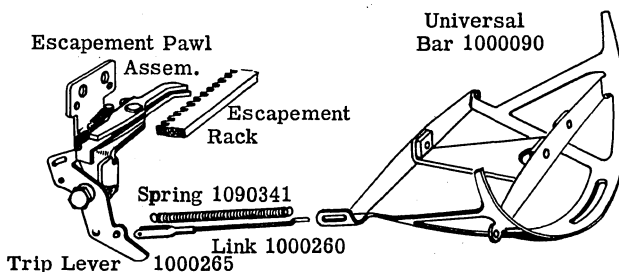
Type Bars, Segment and Guide	#1015582	\$20.00
Type Bar Segment	#1015349	5.40
Type Bar Segment Wire	#1016718	.20

UNIVERSAL BAR AND ESCAPEMENT

THE PURPOSE of the universal bar is to transfer motion from the type bar to the escapement mechanism so as to allow the carriage to move a letter space at each operation of the type bar or space bar.

OPERATION The universal bar 1000090 is supported and guided by two flat springs so that the bar moves the same distance in the same direction when operated by any type bar. When a type bar is actuated, it strikes the forward edge of the universal bar just before the type reaches the platen and moves the universal bar approximately $1/8$ inch. Link 1000260 and spring 1090341 connect the universal bar to the trip lever 1000265 which rocks on a horizontal stud so arranged that the upper end strikes the escapement pawl spacer. This spacer lies between the two escapement pawls. The escapement pawls slide approximately $3/64$ of an inch on their fulcrum stud so that whichever one is engaging a tooth in the escapement rack is pushed to the left by the tension on the carriage. The escapement pawl end then projects into the path of the escapement pawl spacer which in its forward movement forces the escapement pawl out of the rack and permits the carriage to move one letter space to the left.

ADJUSTMENT OF ESCAPEMENT Check the escapement tripping point for end bars and center bars in basket. The escapement should trip just as a bar is entering the prongs on the type guide.



This adjustment is made by lengthening or shortening trip link 1000260 by means of adjusting link 1090278. Before making this adjustment disconnect the space bar link 1013845.

The correct setting of this adjustment gives the fastest operation of the escapement mechanism thus tending to eliminate the piling of characters.

April 18, 1946

Spring 1090341 should hold link 1000260 tightly against front end of slot in universal bar. The link 1000260 must be free to float around in universal bar slot.

Check the tension on the universal bar support springs to see that universal bar is kept tightly against segment on right side.

Left side is purposely about .010 clear to compensate for yielding of universal bar.

If there is too much variation in the tripping point (over 1/8), loosen hex screws 1090449 on rear end of universal bar support 1000041 and move rear universal bar spring up to make center type bars trip nearer platen; move to left to make right hand bars trip closer to platen and to right to make left hand bars trip closer. This movement should be very slight and screws must be tightened before movement can be checked.

REMOVAL UNIVERSAL BAR

- (1) Remove carriage, front rail and dust cover.
- (2) Unhook adjusting link 1090278 and remove link 1000260.
- (3) Unhook spring 1090341
- (4) Loosen screws 1090449 on end of 1000041.
- (5) Unscrew universal bar support 1000041 from segment.
- (6) To replace, reverse procedure being sure that washers 1090448 are in place.
- (7) Check adjustments carefully as outlined above.

REMOVAL - ESCAPEMENT PAWL ASSEMBLY

- (1) Unhook toggle release link (rear) 1000739.
- (2) Unhook pawl release link 1000717. (when old style pawl release lever is used)
- (3) Unhook springs 1090160 from escapement pawls.
- (4) Unhook adjusting link 1090278 from escapement trip lever.
- (5) Unhook counter link 1000260 (if machine is equipped with counter).
- (6) Remove two shoulder screws that hold escapement pawl bracket and toggle release lever.

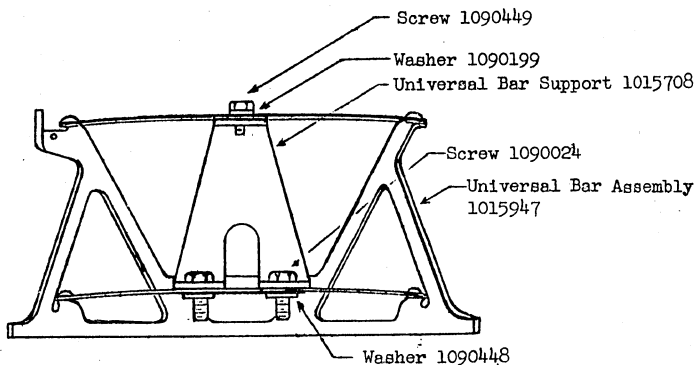
E W M CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #26

TO: ALL E.W.M. SERVICE MEN

SUBJECT: TYPE BAR UNIVERSAL BAR ASSEMBLY & SUPPORT

The type bar universal bar support has been changed as shown in the figure below. The part #1015708 replaces the two posts formerly used. Notice that only one screw is required to hold the rear spring. This does not involve a change in the segment but does in the universal bar assembly because of the single hole in the rear spring.

ADJUSTMENT: The universal assembly is adjusted in the same manner as before. Loosen the two screws #1090024 to centralize the universal assembly. Loosen screw #1090449 to adjust the assembly as described in Section 5, page 5, of the Service Manual.



Universal Bar Assembly-----	1015947-----	\$2.00
Type Bar Universal Bar Support-----	1015708-----	.10
Screw-----	1090449-----	.05
Screw-----	1090024-----	.10
Washer-----	1090199-----	.03
Washer-----	1090448-----	.03

May 8, 1940

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #36

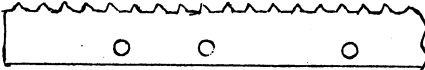
TO: ALL EWM SALES AGENTS, PROVINCIAL MEN AND SERVICEMEN

SUBJECT: SHORT TOOTH ESCAPEMENT RACK

A faster, smoother acting escapement is being introduced on our Pica machines, starting with serial #0112-45967. Escapement pawl travel and friction are reduced. The piling of characters should likewise be reduced due to the speed and ease of the escapement operation.

The changes involved are the escapement rack, the escapement pawl assembly and the back space pawl assembly. These parts used in combination are interchangeable with the corresponding group of parts now used. At present, the short tooth racks are available only on Pica machines.

The escapement is adjusted in the following manner, i.e., the escapement pawl separator must have .010 clearance with the escapement pawl bracket stop, when the type bar is held against the platen. When the type bar is actuated by hand, the escapement should move the carriage as the type bar enters the type guide.



Escapement Pawl Assembly	#1016691
Escapement Rack 12"	1016683
Escapement Rack 16" - 24"	1017269
Escapement Rack 20" - 30"	1017270
Back Space Pawl Assembly	1016692

We are adding a zero as a prefix to the serial number to denote this improvement. For example, 0112-45967 means short tooth rack, standard machine, 12" carriage, Pica type.

November 29, 1940

August 19, 1941

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #49

TO: ALL EWM SALES AGENTS, IBM SERVICE SUPERVISORS, AND
EWM CUSTOMER SERVICEMEN

SUBJECT: PILING

Occasionally there has been trouble with the piling of type on both the short-tooth and long-tooth escapement machines.

Piling of type can be classified in two categories; (1) the crowding together of type and (2) the typing of one letter on top of another. The latter condition is due to escapement failure as revealed by tests in the factory.

The tests show that the tension of the spacer spring, part #1090343, located between the two escapement pawls is not great enough to trip the pawl. This difficulty can be overcome by removing one turn from the spring so as to increase the pull from four to about six ounces.

When making the above adjustment be sure that the loop is turned out so as not to decrease the original length of the spring.

R. F. Sheridan
EWM Customer Service Manager

JWLenhart/jme

September 16, 1941

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #53

TO: ALL EWM SALES AGENTS, IBM SERVICE SUPERVISORS, AND
EWM CUSTOMER SERVICEMEN

SUBJECT: ESCAPEMENT TRIP LEVER LINK

The Escapement Trip Lever Link #1013847 can now be inserted from either side of the slot in the Universal Bar.

Whichever location the link lines up the better should be used. The main idea is to get it to "float" while in position.

Formerly the Escapement Trip Lever Link was located on the outside of the Universal Bar Slot.

R. F. Sheridan
EWM Customer Service Manager

JWLenhart/jfs

REVIEW QUESTIONS

1. In what way will a #21 type bar differ from a # 22 type bar?
2. What is the purpose of the brace between the two type bar fulcrum wires?
3. What are the results from type bars rebounding?
4. What one adjustment can be made to allow several bars to lock into position?
5. What are the typing results from an oversize fulcrum wire hole?
6. What is the purpose of the lug on the top rear part of the type bar?
7. How can different type bars be told a part?
8. How many characters to the inch will pica gothic print?
9. What is the purpose of the universal bar assembly?
10. What parts should be removed to replace an universal bar?
11. How is the universal bar adjusted?
12. How are elite parts marked?
13. How should the link between the universal bar and the trip lever be adjusted?
14. How can piling of characters be corrected or helped, if it isn't caused be misoperation?

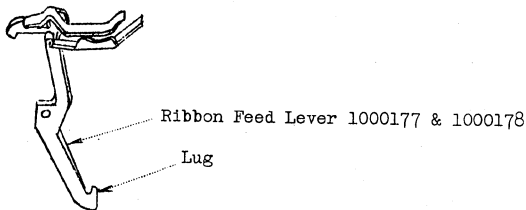
RIBBON FEED & REVERSE

OPERATION A ribbon feed lever 1000177-1000178 at each side of machine is pivoted on the key lever bearing wire and has a lug bent at a right angle on each end. The lower lug engages the ribbon lift bar and the upper lug carries the ribbon feed pawl 1000176 which in turn engages the teeth in the ribbon spool. A ribbon feed check pawl 1000172-1000173 mounted directly under the feed pawl and on a fixed pivot also engages the spool. The rocking motion of the ribbon feed levers 1000177-1000178 causes the spools to feed one tooth at a time and the check pawl prevents a reverse motion of the spool.

A ribbon reverse bar 1000145 carries a pin at either end which has a ribbon reverse pawl 1000151-1000152 freely mounted on it and this same pin serves to control the position of the feed and check pawls so that only the pawls for one spool can be engaged at a time. The rear end of the reverse pawls is forked and supported by a stud on a two piece ribbon reverse lever 1000140-1000141. When the ribbon is unwound from one spool, a continued pull on the ribbon pulls the lever 1000140-1000141 toward the rear and raises the front end of the reverse pawls 1000151-1000152 so that the hook of one engages the bent lug on the ribbon feed pawls 1000177-1000178. As these move forward they pull the ribbon reverse bar 1000145 over, so that the feed pawls which were engaged are thrown out of engagement and the ones on the opposite spool become engaged, thus changing the direction of the ribbon feed. A hairpin spring 1000153 serves to hold the ribbon reverse bar 1000145 in either position. The spring 1090401 serves to hold the feed pawls against the spools and also to pull the feed pawl in the feeding direction.

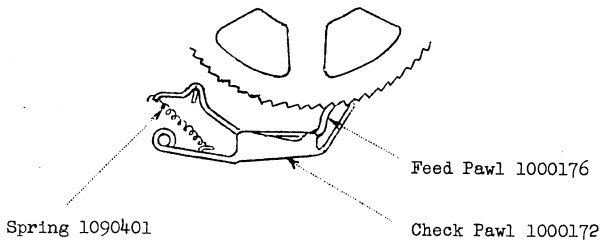
ADJUSTMENTS

- (1) Ribbon Feed Levers 1000177-1000178 Bend the lower lug on the ribbon feed levers 1000177-1000178 so that when a type bar is held against the platen there will be only a small amount of motion between the ribbon lift bar and the ribbon feed levers. Check type bars on both ends and in the center to see that this does not limit the type bar movement.

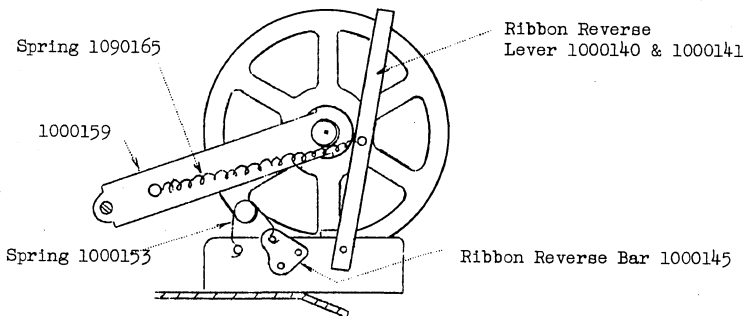


- (2) Feed and Check Pawls. Bend the rear end of the check pawls so that the spools will not feed over $1\frac{1}{2}$ teeth at a time. To test this, move a type bar to the platen by hand, trying bars at each end of the type basket. The feed and the check pawls must be well in the spool teeth when feeding.

They must clear the spool teeth with the nearest type bar against the platen when not feeding. Rotate the spools to see if they are free. The pawls must be shaped to meet this condition.



- (3) Springs 1090165. The tension on springs 1090165 should be as light as possible and yet retain levers 1000140-1000141 safely in position.
- (4) Spool Retaining Springs 1000159. The spool retaining springs should have sufficient pressure against the side of the spool to prevent the spool from over-running. If there is too much pressure on the retaining springs, there may be more friction on the ribbon spools than the feed pawl springs 1090401 can pull.



May 1, 1939

- (5) The Ribbon Reverse Pawls, 1000151 and 1000152, must safely clear the ribbon feed levers when raised by pressing back on the ribbon reverse levers. The ribbon reverse pawls must be free from binds so as to raise easily.
- (6) Oil all parts of the feed and reverse mechanism.
- (7) The Ribbon Reverse Arms must be clear of the ribbon spool teeth. Their position can be adjusted by bending the lug against which the lever rests.

TO TEST the reverse mechanism when the ribbon is feeding to the right, press back the left ribbon reverse lever and operate the #2 type bar; when the ribbon is feeding to the left press back the right ribbon reverse lever and operate the #1 type bar. The ribbon movement should be reversed by this action.

Other Reasons for Reverse Failure

- (1) The ribbon reverse bar 1000145 may not be free.
- (2) The ribbon reverse bar spring 1000153 may have too much or too little tension.

Other Reasons for Ribbon Feed Failure

- (1) The feed pawl springs 1090401 may be weak.
- (2) The feed and check pawls may be worn or may have burred edges.
- (3) The ribbon feed and check pawls must feed straight. Try the feed pawls 1000176, holding the check pawls 1000172 and 1000173 down to make sure the feed pawls operate straight and do not need to be guided by the sides of the check pawls. If the feed pawls do not feed straight, occasionally one will jump out of position. Bend the lever arm that holds the pawl to correct this condition.
- (4) Defective teeth on a ribbon spool.

NOTE: When the ribbon has traveled back and forth from one spool to the other several times it becomes loosely wound on the spools and will not reverse readily. The ribbon feed winds up ribbon slack before the reversing mechanism will operate - thus while this is going on the ribbon does not travel at all and the typist will have a faint line typed across the sheet. To correct this wind up the slack ribbon on the ribbon spool. There is a manual ribbon reverse knob to help operators reverse their ribbons when they become loosely wound on the spool.

April 20, 1942

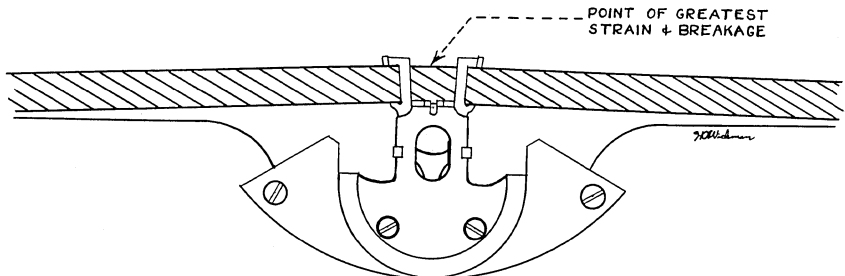
EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #70

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS

SUBJECT: CARBON PAPER RIBBON BREAKAGE

Due to the fact that the carbon paper ribbon must vibrate up and down with each typing stroke, a strain is placed upon the ribbon at the highest point (See drawing). This also applies to P.S.M. Machine.

It is important that the ribbon be raised high enough on each stroke to allow a slight margin at the top of the ribbon, which is not touched by the longest characters. This safety margin will prevent breakage caused by large or long characters which have a tendency to perforate the ribbon and thus causing it to break.



Do not thread the carbon paper ribbon through the conventional guide for fabric ribbon on the left side of the machine as this will increase the drag on the ribbon.

The supply spool must be free and the ribbon should feed properly through the tension arm #1012653. Check all the guides for sharp corners and proper alignment.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

The Electric Writing Machine ribbons are manufactured for the particular requirements of the electric typewriter.

The ribbon is a strip of the highest grade finely woven cotton tape, inked by a special process. The long fibre cotton, evenly woven into the thin, uniform tape with clean finish and close nap furnishes such a reservoir that there is no fringe on the edges of the characters when the ink is transferred to the paper.

Long life is a result of proper combination of the fabric and ink. The inking is non drying and will outlast the average cheap ribbon.

The following ribbons are suggested for field use:

Elite Machine -----#40 inking
Pica Machine -----#50 inking
P.G. Billing Machines - #60 or #80 heavy duty

Electric Writing Machine ribbons are 9/16 inch wide and 16 yards long. Ribbon manufacturers in many cases supply ribbons for our machine only 12 yards long, which is standard length for all manual machines.

The manual machine ribbons are 1/2 inch wide and 12 yards long so that means Electric Writing Machine ribbons have a third more ribbon with a small addition in price. Also the extra width in ribbon helps eliminate the bleeding of characters.

The Electric Writing Machine ribbons always come wound on a ribbon spool and it is advisable to suggest that the operator throw away either the right or left spool each time a new one is installed. This will prevent one spool becoming worn and causing ribbon feed trouble.

It takes less than a minute to install a ribbon for an operator, so volunteer your services if you see the machine needs one. It helps keep the serviceman on the good side of the operator.

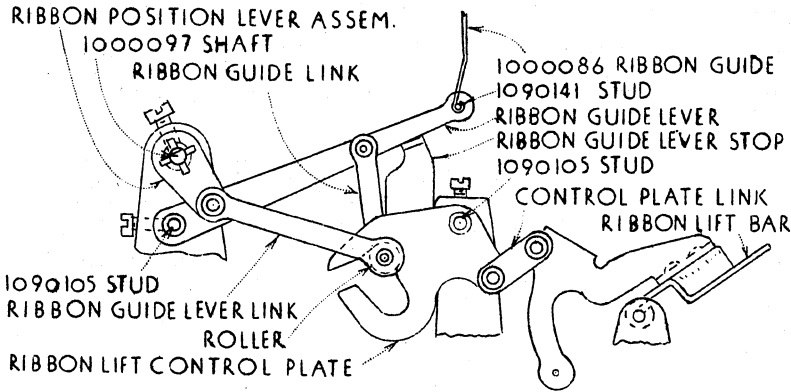
May 1, 1939

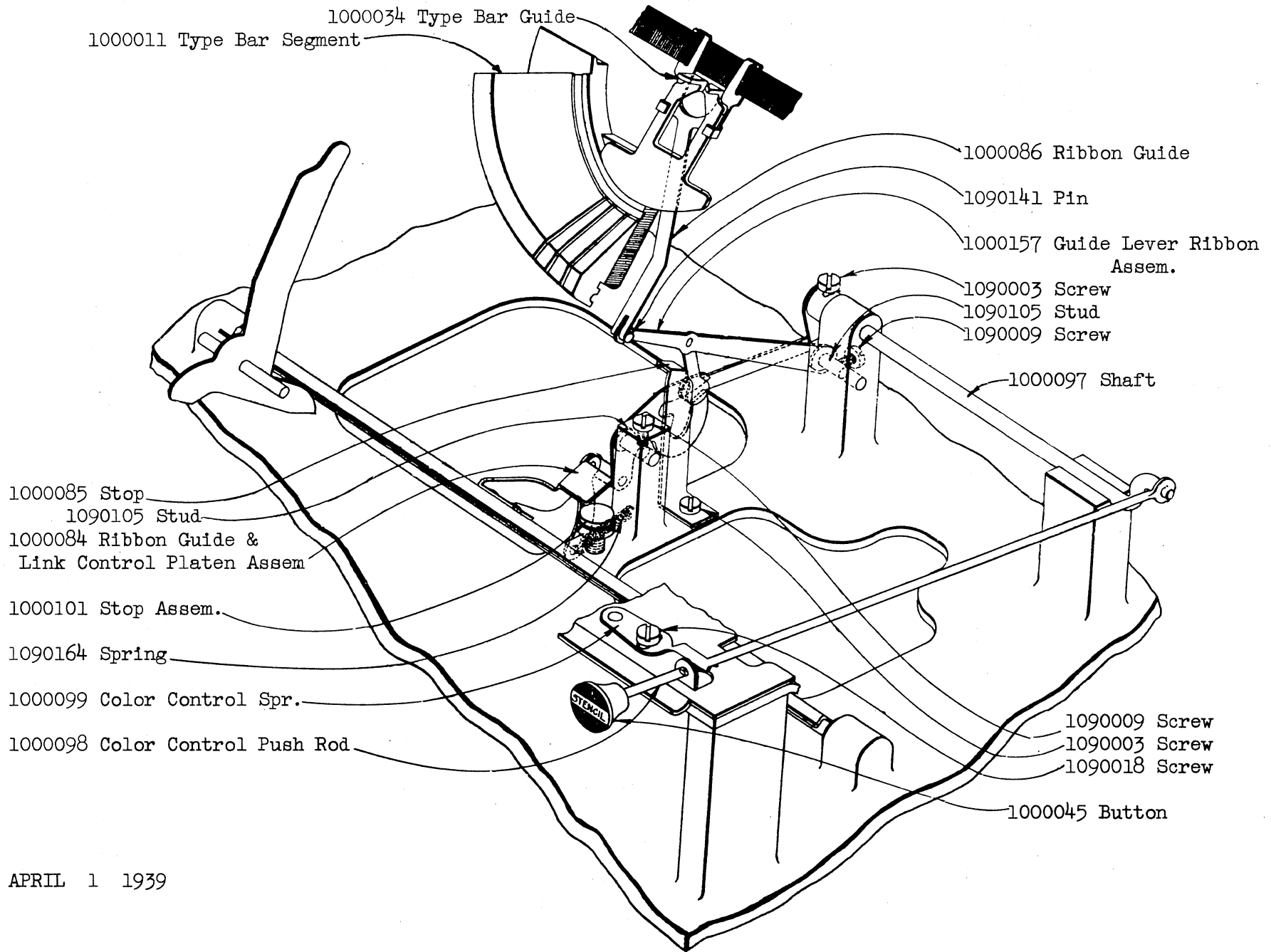
RIBBON CONTROL MECHANISM

THE PURPOSE of the Ribbon Control Key is to set a two-color ribbon to write in either color or to disconnect ribbon lift entirely so a stencil can be written.

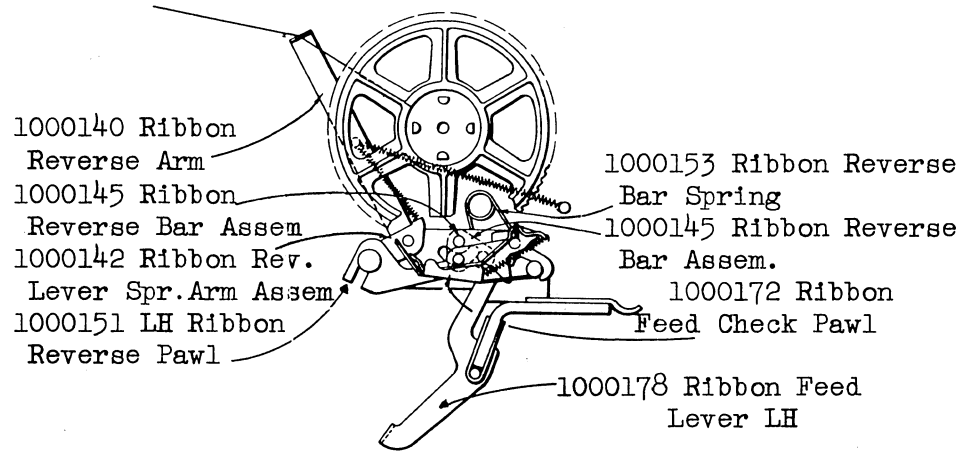
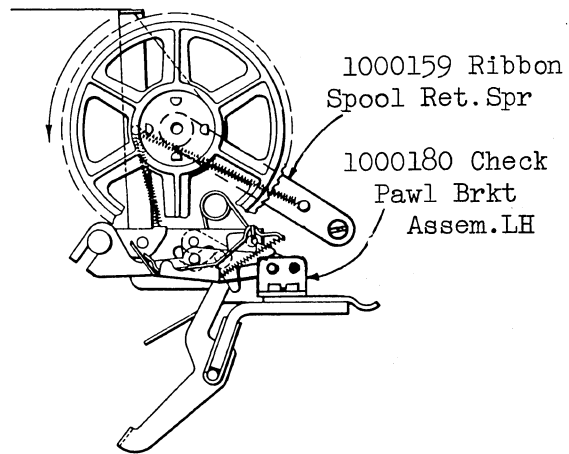
OPERATION When any type bar moves toward the platen the bell crank which connects it to the cam unit, operating through a tail extending to the rear, swings ribbon lift bar which extends across the machine and through control plate link swings ribbon lift control plate on stud 1090105.

The ribbon guide 1000086 is carried on the forward end of the ribbon guide lever which pivots on stud 1090105 at rear end. At an intermediate point a ribbon guide lever is mounted which is connected by roller and ribbon position lever link to ribbon position lever assembly on shaft 1000097.

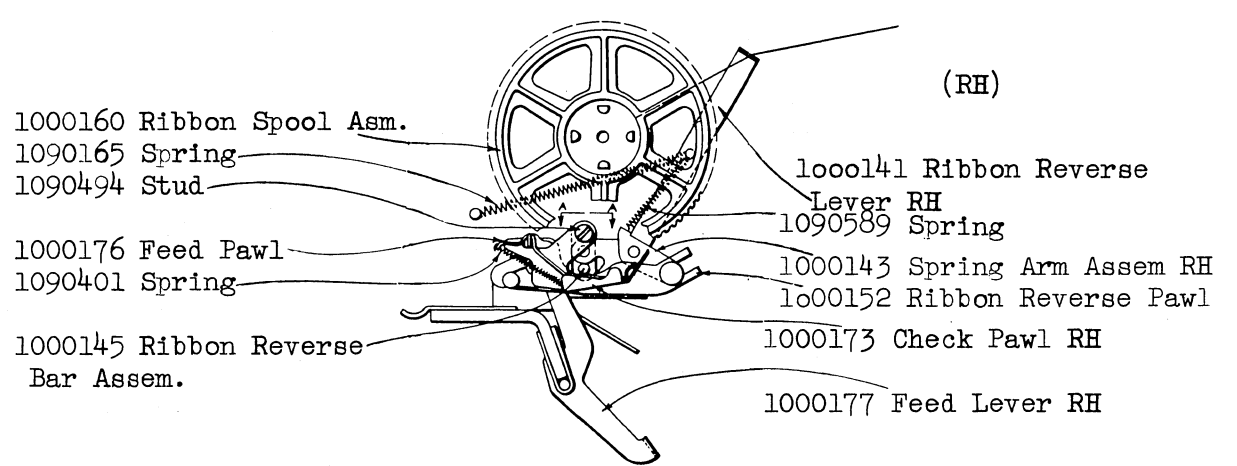
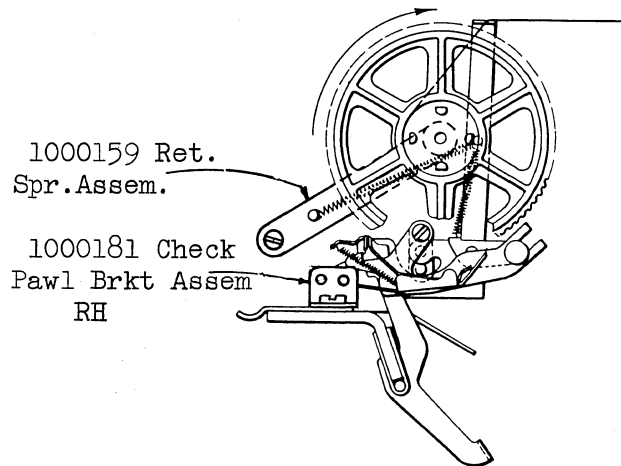




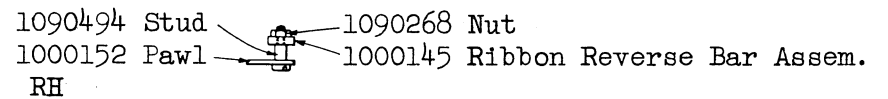
APRIL 1 1939



LEFT END



RIGHT END



APRIL 1 1939

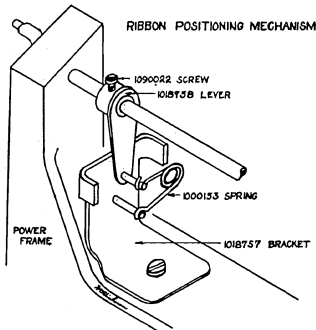
April 20, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #69

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: CHANGE ON RIBBON CONTROL MECHANISM

The ribbon control mechanism is now held in its respective positions by means of a hairpin spring.

Hairpin spring #1000153 holds the lever #1018758 against the ears of bracket #1018757 for the upper and lower writing positions of the ribbon. The mechanism is held in the neutral or stencil position by the old method of a notch in push rod #1018478 and the control spring #1018476.



Adjustment: The position of the ribbon is now adjusted by bending the ears on the bracket, in or out, as may be required.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

June 10, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #72

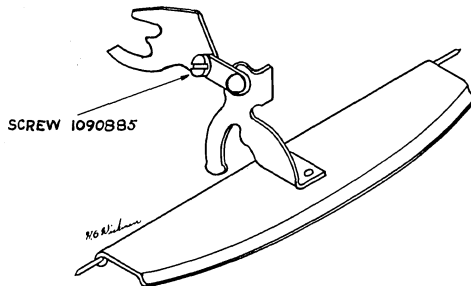
TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: RIBBON LIFT BAR REPAIR

Occasionally a rivet will drop out of the control plate link which connects the ribbon lift bar with the ribbon control plate.

When this happens the ribbon lift bar and control plate must be removed and a new one installed unless the following repair is made.

Shoulder screw #1090885 and nut #1090268 can be used in place of a missing rivet in the link. This repair proves very satisfactory and saves the field man and customer hours of time.

RIBBON LIFT BAR AND CONTROL PLATE



R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman:jme

When ribbon lift control plate swings it carries ribbon guide up to the printing point and the amount of movement is governed by position of roller in slot in ribbon lift control plate and this position is controlled by color control push rod 1000098. When pushed in the type bar strikes the upper half of the ribbon. When pulled out the type bar strikes the lower half. When in the middle position the ribbon does not move up at all and the type strikes the paper directly.

A ribbon guide lever stop 1000085 serves to keep the roller from dropping into the vertical slot in ribbon lift control plate when in stencil position or when shifting from upper to lower ribbon position.

ADJUSTMENTS With type bar against platen, set stop 1000101 to prevent further movement of ribbon lift bar assembly 1000084, being careful that it does not interfere with the type bar movement. Check all type bars carefully by hand.

With color control spring 1000099 in middle notch of color control push rod, adjust spring so roller will be directly over vertical slot in ribbon lift control plate. Then move the spring backward or forward slightly to obtain correct coverage. Bend vertical portion of ribbon guide 1000086 slightly to secure complete coverage if necessary. Test all characters. Check upper end of ribbon guide for sliding freedom and see that it does not interfere with line gauge.

REMOVAL

- (1) Ribbon Guide 1000086. Reach in from bottom of machine and remove the wire loop on pin that connects ribbon guide lever and remove pin. Pull ribbon guide out at top of machine.
- (2) Ribbon Guide Lever Assembly 1000157. First remove the main spring drum assembly.
- (3) Ribbon Lift Bar and Control Plate Assembly 1000084. First remove power frame from base.

Section 6

REVIEW QUESTIONS

1. What are the results from bad teeth on the ribbon spools?
2. What is the proper adjustment on the ribbon feed levers?
3. What part actuates the ribbon feed levers?
4. What is the purpose of the hair-pin spring on reverse bar?
5. What is the proper adjustment on the ribbon spools?
6. How should the corner guides be adjusted?
7. How long are the Writing Machines ribbons?
8. How wide are they?
9. Name the type of inking suitable for different styles of machines?
10. Name two different methods of raising or lowering the center ribbon guide?

December 3, 1941

EWM CUSTOMER ENGINEERING DEPARTMENT
LETTER OF INSTRUCTION #59

TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING SUPERVISORS, AND
EWM CUSTOMER ENGINEERS

SUBJECT: RIBBON MOVEMENT

On machines above #50,000 that give ribbon feed or reverse trouble, check the felt end pieces in the top cover. If there is an indication that the felt has loosened and is touching the spools, remove it.

In case the ribbon reverse trouble still exists after removing the felt end pieces from the top cover plate, shorten the present ribbon feed pawl spring approximately three turns, or install spring #1090401 on the ribbon feed pawl.

R. F. Sheridan

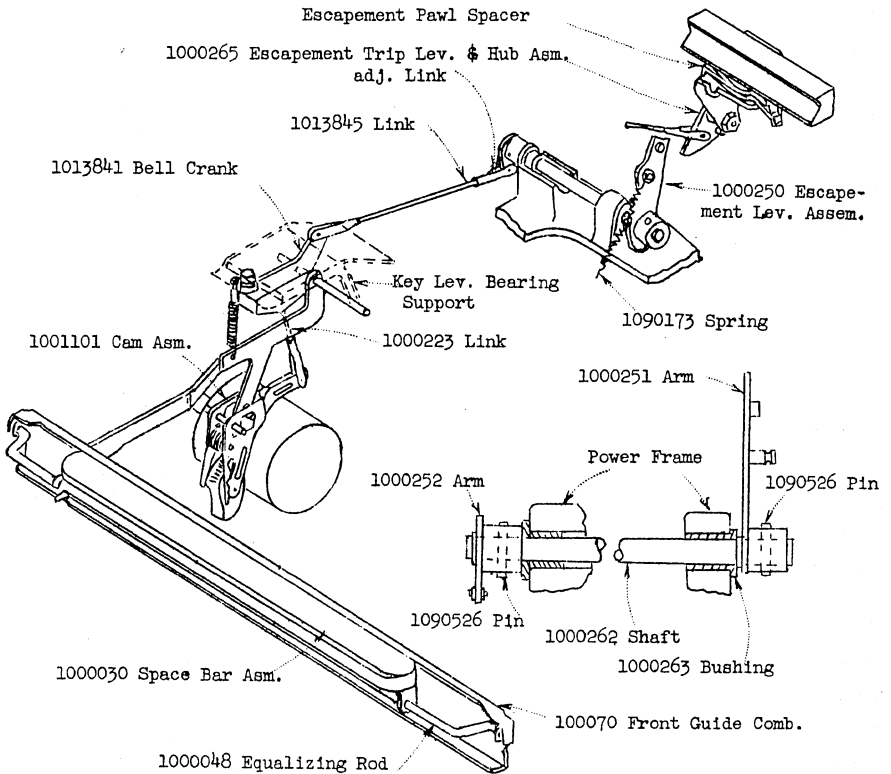
EWM Manager, Customer Engineering

RFS/jfs

SPACE BAR MECHANISM

THE PURPOSE is to operate the escapement for letter spacing without printing characters.

The space bar trips cam 1001101 which operates through link 1000223, bell crank 1013841, link 1013845, and escapement lever to strike the lower end of escapement trip lever 1000265 and trip the escapement pawls.



ADJUSTMENT

- (1) Make sure that spring 1090173 is holding escapement bell crank 1013841 firmly against its stop under key lever bearing support.
- (2) Adjust cam unit as explained under "Cam Units"

May 1, 1939

- (3) Adjust link 1013845 so that with the power off and the power roll revolved by hand (by turning motor coupling) the escape-ment pawls will be tripped just before the high point of the cam is reached.

REMOVAL

- (1) Unhook adjusting link 1090278 from arm 1000252.
- (2) Drive tapered pin from hub on arm 1000251.
- (3) Drive tapered pin from hub on arm 1000252.
- (4) Unhook spring 1090173.
- (5) Remove right bushing 1000263 which is pressed into casting.
- (6) Pull shaft 1000262 from bearings.

April 18, 1946

September 12, 1941

EWM CUSTOMER SERVICE DEPARTMENTLETTER OF INSTRUCTION #56

TO: ALL EWM SALES AGENTS, IBM SERVICE SUPERVISORS, AND EWM CUSTOMER
SERVICEMEN

SUBJECT: QUIET SPACE BAR

A new quiet space bar has been installed on all machines commencing with #50852. The new mechanism succeeds in eliminating most of the noise caused by the former space bar.

Escapement key lever #1015237 has been altered to #1017127 which is notched so that it does not contact the front guide comb. Part #1017126 shift latch stop now forms a bracket around the escapement key lever and assumes the added function of regulating the upward and downward movement of the space bar.

The escapement key lever should be adjusted so that its upper edge, with the exception of the notched area is on the same horizontal plane as the top of the opening of the front guide comb through which it passes. This adjustment can be made by raising or lowering the back end of the shift latch stop.

An additional hole has been inserted in the bell crank #1013843. The connecting link #1000019, which supersedes part #1000223, is now attached to the hole farthest away from the key lever bearing support.

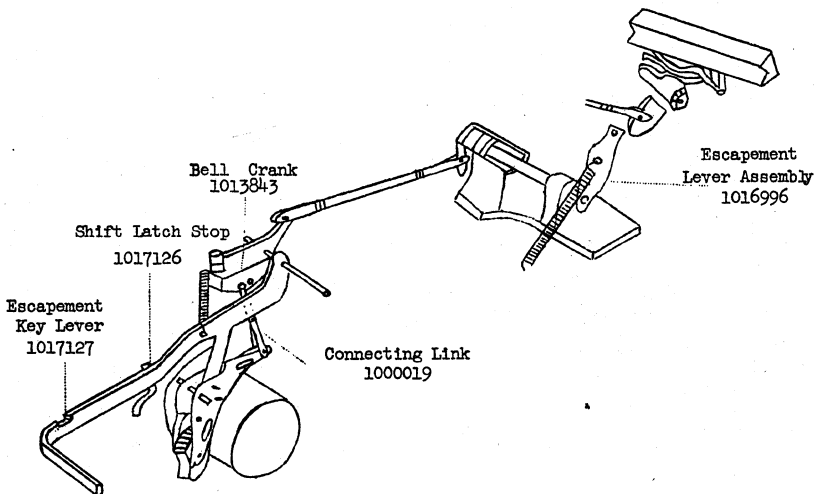
Part #1016996 escapement lever assembly replaces part #1000250. It is located nearer the position of contact with the escapement trip lever and hub assembly.

Although the new style space bar can be installed in the field, we advise against it since the changeover would involve a complete dismantling of the machine.

R. F. Sheridan
EWM Customer Service Manager

JWLenhart/jfs

New Style Space Bar
Mechanism



TABULAR

THE PURPOSE is to permit movement of the carriage to the left directly to any previously determined point on the writing line.

OPERATION The tabular key trips cam unit 1001104 which operates through link 1000223, bell crank 1013840, link 1013844 and tabular actuating lever 1000704, swings tabular lever 1015282 in a horizontal plane until its right hand end lies in the path of the tabular stop 1015100 (mounted on carriage tabular rack). The tabular lever is held in this position by latch 1018479.

The tabular lever 1015282 operates pawl release lever 1014246 to pull the escapement pawls out of the escapement rack and also operates, through tabular rebound check lever 1012405 against stop 1012466. Tabular lever 1015282 is slotted at its fulcrum point to permit movement to the left against tension of spring 1090435.

Tabular latch 1018479 is held by a coil spring against a stop lug 1000237.

When the tabular lever is moved as explained above, the escapement pawls are pulled out of rack, the carriage is pulled to the left by the main spring until the next tabular stop 1015,100 strikes the projecting end of tabular lever, causing it to slide to the left until stopped by its fulcrum stud (in slot previously mentioned) at which point it should just be disengaged from latch 1000236. Spring 1090435 and rebound check spring 1090626 will cause the tabular lever 1002806 to return to its original position, parallel with the rear rail and permit the escapement pawls to re-engage the rack.

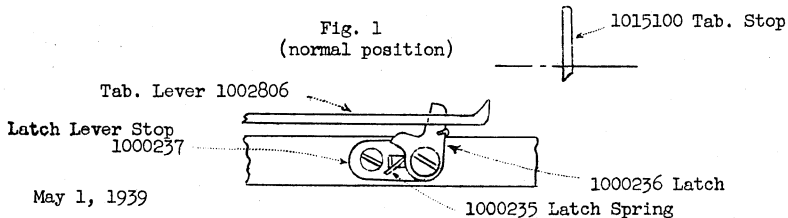
During the time the tabular lever is latched out the rebound check 1012405 is held against its stop 1012466 by rebound check spring 1000243 so that it also lies in the path of the moving tabular stop. The tabular stop slides over it, pushing it out of the way, and it swings out again in back of the stop so as to check any tendency of the carriage to rebound from tabular lever.

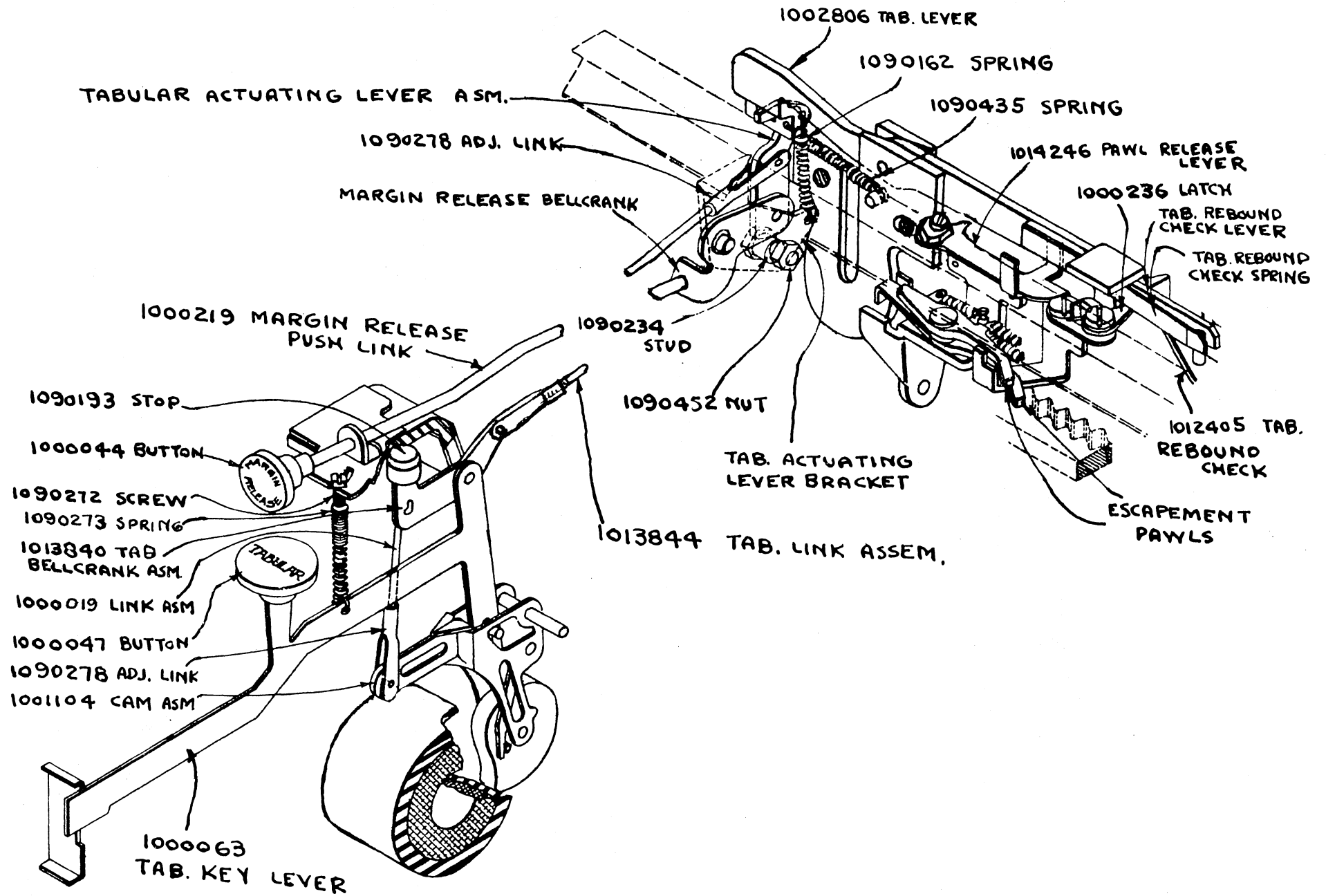
REMOVAL OF TABULAR LEVER BRACKET ASSEMBLY.

- (1) Unhook spring 1090435.
- (2) Unhook adjusting link 1090278 from tabular actuating lever 1000228.
- (3) Remove margin rack.
- (4) Remove two screws from back of carriage rail that hold bracket in place.
- (5) When replacing assembly be sure that rebound check spring 1000243 and rebound check lever 1000240 fork the stud on rebound check 1012405.

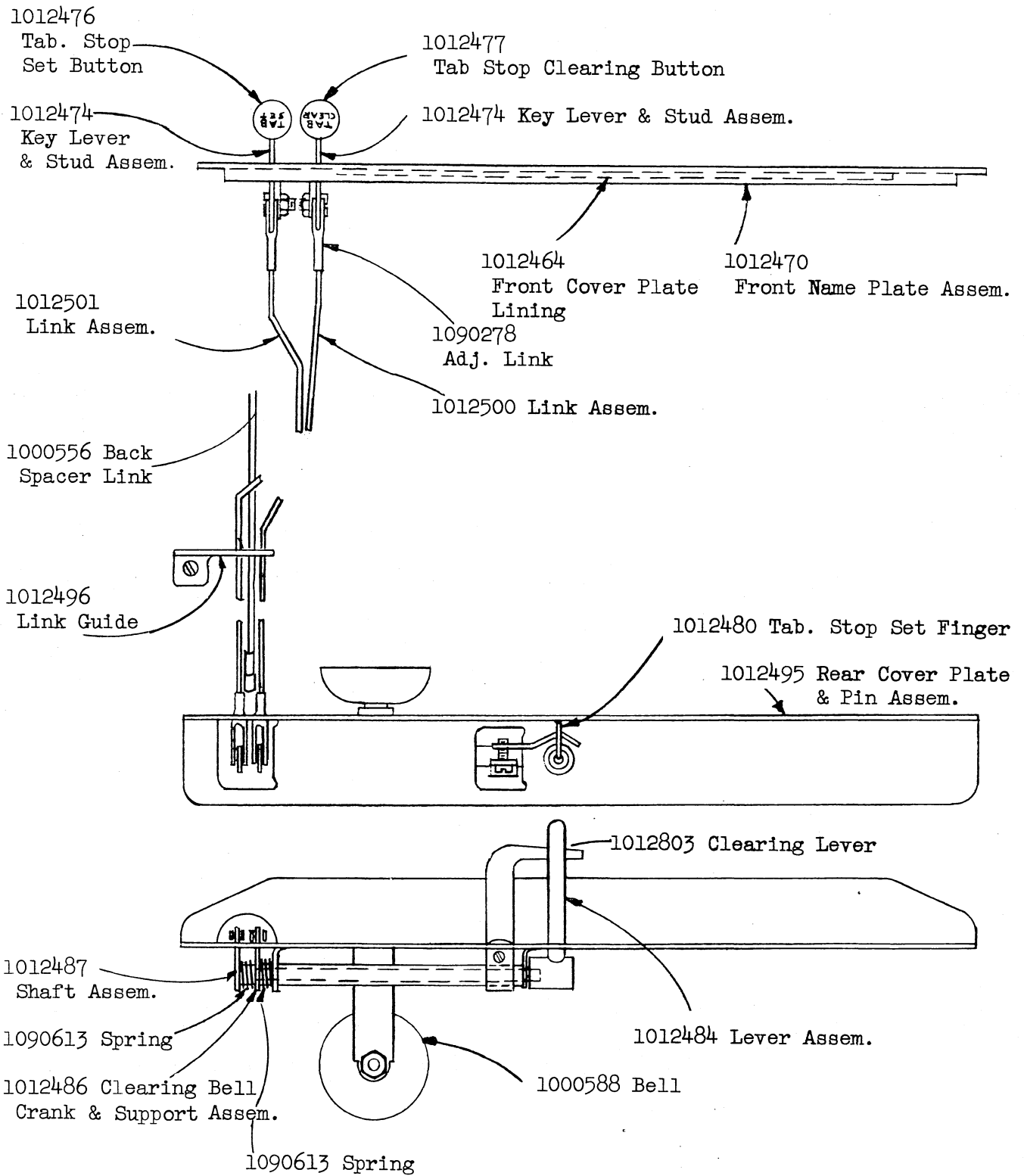
ADJUSTMENT

- (1) Adjust cam to the power roll so the release lever will drop behind lug. Make sure leather stop on tabular bell crank is up against key lever bearing support.
- (2) Adjust the eccentric stud 1090234 on the rear lower corner of the tabulator actuating bracket 1000233 so that the horizontal lug on the right hand end of the tabular lever has .010 clearance from the under side of the margin rack.
- (3) Adjust the tabular stop rack (by turning the nuts on either end) so that when the carriage is held by the escapement pawls the tabular lever will just swing clear of the left hand face of the tabular stop. Try this with stops at each end and in the middle of the rack. Tighten the tabular rack nuts evenly so as not to spring the carriage frame.





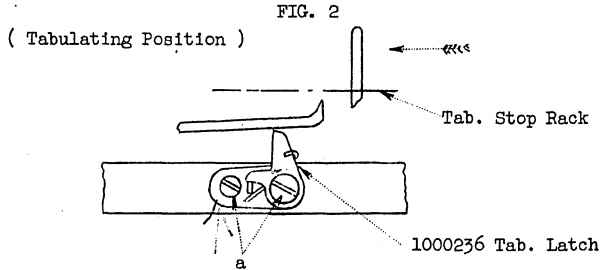
May 1, 1939



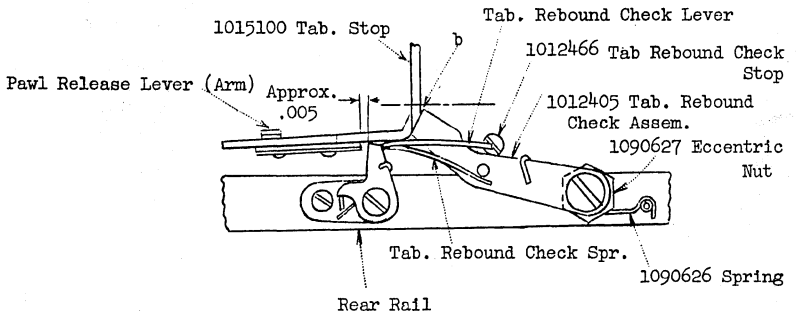
APRIL 1, 1939

- (4) Latch the tabular lever out by hand. The right hand end of the tabular lever should clear the face of the tabular stop rack by approximately $1/16$ of an inch or cover approximately half of the tabular stop. (See Fig. 2)
- (5) Set tab lever stop #1014473 on top of rear rail to prevent tabular lever throwing into tabular rack.

On the earlier machines, the above adjustment is made by adjusting the opening in the tabular lever fulcrum point.



- (6) (a) The eccentric stud 1012466 (fig. 3) should be adjusted so that the tip of the rebound check lever 1012405 will have approximately $1/64$ " clearance with the face of the tabular rack.
- (b) The eccentric nut 1090627 (Fig. 3) should be so adjusted that when the tabular lever is held latched out by hand there will be less than $1/64$ " play between the tabular stop and the rebound check lever. (See "b" of Fig. 3)



- (7) Adjust the tabular latch 1000236 so that with the tabular lever latched back (Fig. 2) there will be a safe engagement of the latch with the lug on the lower side of the tabular lever.

Loosen the screws shown at (a) in Fig. 2 that hold the latch bracket to the rear rail to make this adjustment. Hold the tabular lever to the left side of the elongated slot, and when the latch is up against the stop 1000237, there should be .005 or .008 movement between these two points. (Fig. 3)

- (8) Bend the rear vertical arm on the pawl release lever 1014246 (if necessary) so that when the tabular lever is latched out the escapement pawls 1000276-1000277 will be pulled out so as to just clear the escapement rack.
- (9) To test the adjustment of the tabular actuating link 1013844, press the tabular key to release the cam and turn the power roll by hand, while holding the carriage from moving to the left when the pawls are released. The adjustable link should be set so that the tabular lever goes out beyond the latch and drops back on it. Make sure the tabulator lever will snap back to the original position when held to the left side of elongated slot.

Connect the wall plug. Try the tabular operation by power using the back spacer on each stop. A bind in the back space pawl may interfere with the tabular operation.

The right upper corner of the plate on the back of the tabulator lever bracket should be bent (only if necessary) so that the tabular lever will move out by hand just beyond the latch 1000236 but not far enough to touch the tabular rack.

GENERAL The tabular rack is adjusted so the tip of the tabular lever just clears the left side of the tabular stop, same as former model.

The elongated slot in the tabular lever 1002806 has been opened up so the tip of the tabular lever is two (2) spaces to the right of the stop when it knocks off instead of only being one (1) space as on former model.

The rebound chock 1012405 must be held up against the tabular lever by spring 1090626. If it is allowed to drop down it will not engage in back of the tabular stop, but if it comes up too high it will catch on the end of the tabular lever and will wedge there holding the end of the tabular lever out. If one is too high, it can be bent down.

Binds can usually be located in the following places:

- (a) At the fulcrum point
- (b) Tension on the tension spring 1090626 too heavy.
- (c) Tension on the check spring 1000243 too heavy.
- (d) Actuating lever 1000227 interfering in slot. Should clear each side.
- (e) Clearance between top of tabular lever and bottom of margin rack not sufficient.

May 1, 1939

EWM CUSTOMER SERVICE DEPARTMENT

LETTER OF INSTRUCTION #38

TO: ALL EWM SALES AGENTS, SALESMEN AND SERVICEMEN
SUBJECT: 14 PITCH TABULAR MECHANISM

The tabular key on the 14 Pitch machine will tabulate the carriage to every other typing space.

The close spacing on 14 Pitch machines makes it necessary to install a tabular stop in every other space in order to give the rack sufficient strength for constant and efficient operation.

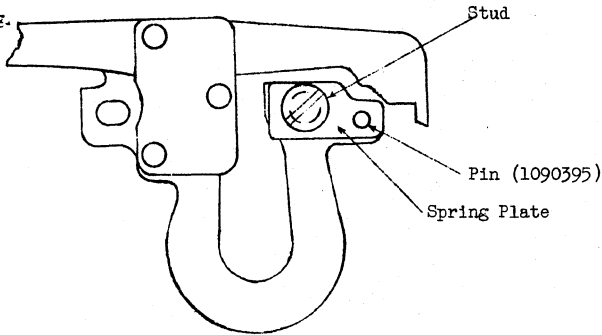
January 1, 1941

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #24

TO: ALL E.W.M. SERVICE MEN
SUBJECT: TABULAR LEVER SPRING PLATE

To prevent the tabular lever bracket from loosening, a spring has been added under the stud which holds the tabular lever bracket to the carriage rail. The hole has been enlarged in the tabular lever bracket to allow for the shoulder of the stud.

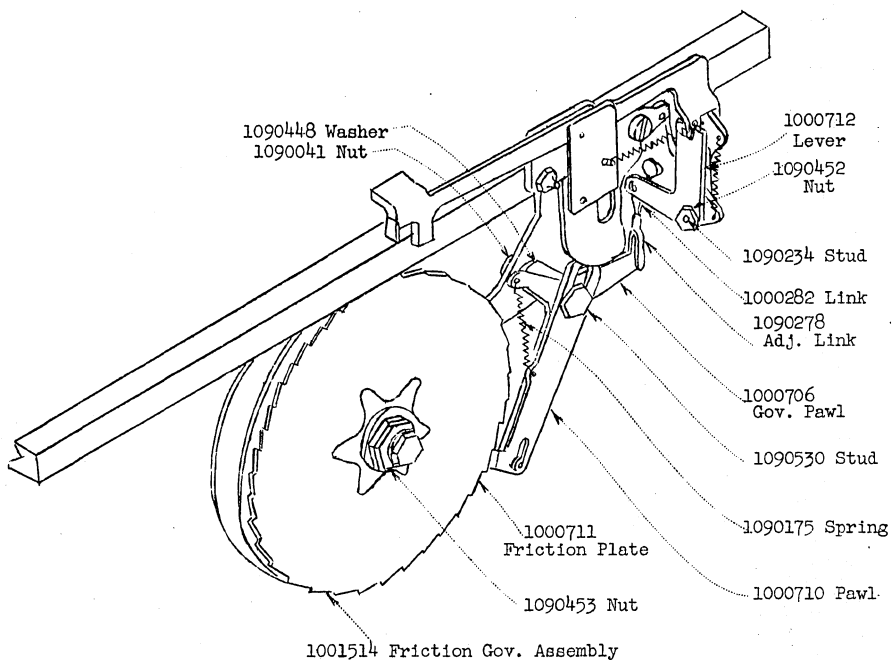
The tabular lever with the enlarged hole, the stud and the spring must be used together. All new machines are being equipped with this spring.



Tabular Lever Assembly----- (12" & 16" machines)----- #1014472
Tabular Lever Assembly----- (20", 24" & 30" machines)--- #1015282
Stud-----used with tabular lever #1014472----- #1091226
Stud-----used with tabular lever #1015282----- #1091227
Spring Plate----- #1016658

April 30, 1940

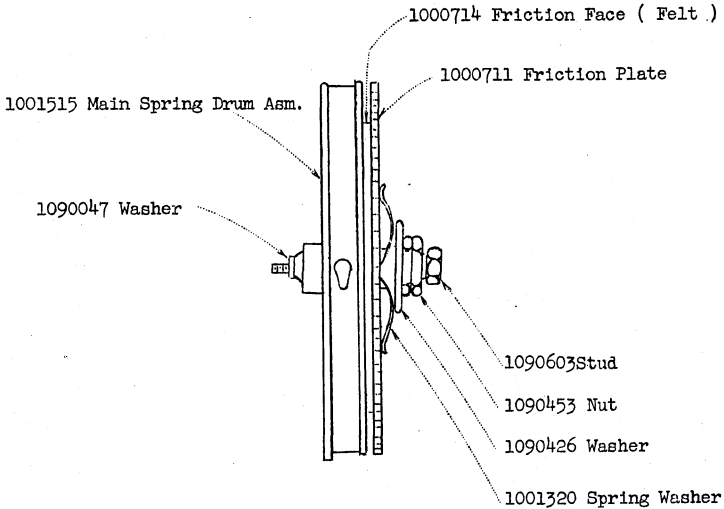
TABULAR FRICTION GOVERNOR The purpose is to regulate speed of the carriage when tabulating and prevent excessive shock to the carriage. When the tabular lever is actuated it operates through the friction governor control lever 1000712 and link 1000282 to cause pawl 1000710 to engage a tooth in the friction governor plate 1000711. This plate has an adjustable friction engagement with the main spring. The rotation of this drum in pulling the carriage to the left for tabulating is thus retarded until the tabular stop strikes tabular lever and causes it to return to its original position and disengage the friction governor pawl. The friction governor has no effect on movement of carriage except when tabulating.



The friction governor control lever 1000712 has a "V" member extending upward straddling the tabular lever tail and the motion of the tabular lever is transmitted through this "V" to the pawl 1000710.

ADJUSTMENTS Adjust link 1090278 so that when the tabular lever is in its normal position the point of pawl 1000710 just clears the points of ratchet teeth on the friction governor plate 1000711.

Adjust the friction governor plate 1000711 by means of nuts 1090453 to increase or decrease the amount of friction.



There should be sufficient friction to prevent excessive shock to the carriage, yet the friction should be set light enough to allow the carriage to release the tab lever when tabulating 10 spaces from the left of the last stop.

REMOVAL:

- (1) Remove resistor and condenser assembly.
- (2) Take out stud 1090603.
- (3) Stud 1090530, which fastens governor control lever to the power frame, is threaded into the casting and locked by nut 1090041.

May 1, 1939

KEY SET TABULAR

Pressing the tabular stop set button draws the stop set finger 1012480 forward to press against the upper part of tabular stop, which places it in the "set" position.

Pressing the tabular stop clear button draws forward the stop clear lever 1012491 to move the stop back to the "clear" position.

ADJUSTMENTS

- (1) The set and clear key links must be formed to pass freely through the guide 1012496. Bend the one finger on this guide to clear the basket spring, to prevent wear on the basket spring.
- (2) The holes in the rear cover plate are elongated for adjusting the stop set lever to strike squarely on the tabular stops and to strike on the proper stop.

To adjust the rear cover plate to strike the proper stop:

Adjust the rear plate to the left or right so the set finger is directly behind a stop and set that stop. Observe the reading on the front paper scale and then tabulate to the stop which has been set. If the reading on the front scale is not the same as before, the rear plate must be moved to the left or right.

- (3) Set Key Link 1012501. With the carriage in the extreme right position so the set lever is clear of the stops, adjust the 1090278 link so that with the stop set button down the stop set finger just touches the tabular rack.
- (4) Clear Key Link. Adjust the clear lever so that when the tab set lever is in the forward position, it does not interfere on the tabulator clear. By loosening the clamping screw the stop clear lever can be moved sideways so the "v" of the form is centrally located in relation to the set lever.
- (5) The set and clear levers 1012484 and 1012491 must be firmly tightened to the shafts to allow no side play.
- (6) The tension of the springs on the clear and set bell crank assemblies can be increased to assure a more positive action of the set and clear levers.

April 18, 1946

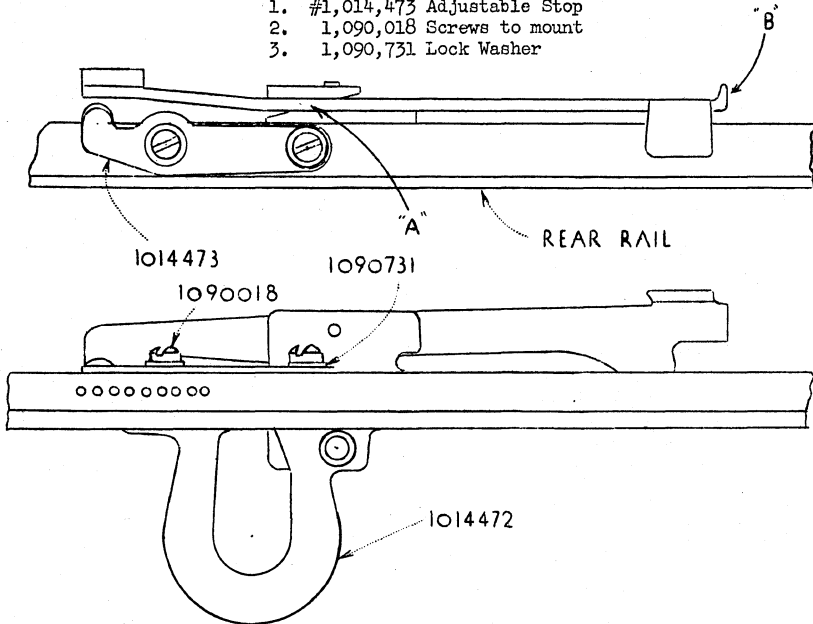
IMPROVEMENT--TABULAR LEVER ASSEMBLY #1,014,472

MACHINES AFFECTED: 12 inch and 16 inch carriage machines only.

REASON: Tabular Lever Assembly #1002806 is being superseded by #1,014,472 which is adjusted and operates the same, but has been redesigned to give more strength.

ADDITIONAL PARTS NEEDED:

1. #1,014,473 Adjustable Stop
2. 1,090,018 Screws to mount
3. 1,090,731 Lock Washer



The fulcrum "a" has been opened up to give the lever greater swinging freedom. To prevent the tip of the lever "b" from swinging out far enough to hit the tabular rack, when the movement is being operated, Adjustable Stop #1,014,473 should be mounted to the rear rail assembly.

NOTE: On 20", 24" and 30" carriages use tabular lever #1002806 with heavy horse shoe.

May 1, 1939

TABULAR ADJUSTMENTS IN SEQUENCE

1. Adjust cam to power roll.
2. Adjust eccentric 1090234 for height of tab lever.
3. Adjust tab rack.
4. Adjust tab latch for length.
5. Adjust tab latch stop for clearance between latch and tab lever.
6. Adjust rebound check for 1/64 inch play with tab lever latch out.
7. Adjust eccentric 1012466, rebound check to just clear tab rack.
8. Adjust pawl release lever 1014246 so that escapement pawls just clear the rack during tabulation.
9. Adjust tab actuating link 1013844.
10. Adjust stop 1014473 to prevent tab lever entering tab rack.
11. Adjust link 1000282 for proper engagement of tab governor pawl.
12. Adjust lock nuts 1090453 on spring drum for control of carriage speed.

REVIEW QUESTIONS

1. How many spaces should the tabulator lever stop, beyond the stop?
2. How far should the escapement pawls be held out of the rack, by the tab lever?
3. Name the points where a bind is apt to be located.
4. Why is it necessary to check stops at different positions on the tabulator rack?
5. What are the results from a worn rebound lever?
6. How is the final stop adjusted for the tabulator lever movement?
7. What are the effects of a tabulator lever traveling too far and hitting rack?
8. Will the amount of tension on the tabulator make any difference with tabulation?
9. Why is it advisable to always use the soft felt liner, instead of the hard liner on the tabulator governor?

BACK SPACE MECHANISM

OPERATION Back space key trips cam 1001104 and operates through link 1000019, bell crank 1000551, link 1000556, bell crank 1000550, and link 1000559 to cause back space pawl to engage escapement rack and pull carriage with it until it is stopped on back space pawl stop 1000565. The two springs 1090160 from escapement pawls are attached to the back space pawl and hold the toothed end against the lug on back space pawl bracket and the slotted end against the fulcrum stud.

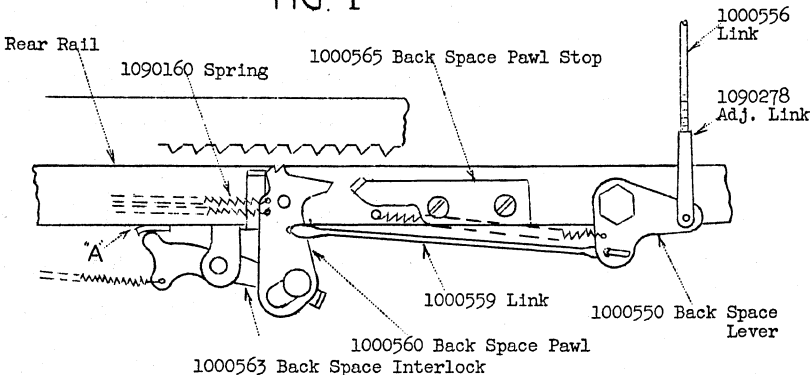
During the first part of the movement, the slotted end slides on its fulcrum stud diagonally toward the escapement rack, and the toothed end slides at right angles to the rack, (being held against the lug on back space pawl bracket) until one of its teeth engages the rack tooth and the slotted end reaches the limit of its movement. The continued pull on the pawl causes the carriage to move until the escapement pawl drops into the next tooth and the back space pawl strikes its stop bracket 1000565 as shown in Fig. 2.

Back space interlock 1000563 prevents pawl 1000560 from engaging the rack while carriage is either returning or tabulating. If tabular lever 1002806 has been actuated or if escapement pawls have been pulled out of rack by carriage release lever, the back space interlock 1000563 will assume the position shown in Position 3 and the back space pawl will merely rotate on its fulcrum stud and not engage the escapement rack to move the carriage.

ADJUSTMENTS Remove the rear cover plate and disconnect wall plug.

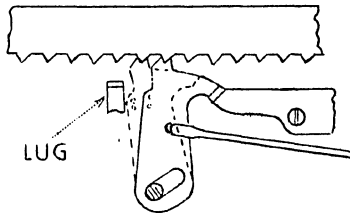
- (1) The back pawl 1000560 must be free.
- (2) Adjust the single lobe cam (See Cam Unit)
- (3) The back space pawl must slide into the tooth of the rack on one space and between the two teeth on the next space back with a small clearance between the faces of the pawl and rack teeth (1/64") as shown in Fig. 4. Bend the lug on the back space pawl bracket to obtain this condition. The pawl must rest against this lug in its normal position. Test for this condition by moving the cam by hand.

FIG. 1



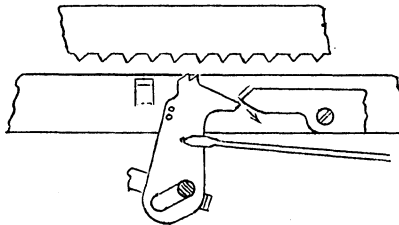
- (4) (a) Set the back space stop 1000565 to limit the movement of the back space pawl 1000560 so that the carriage will be moved just enough to permit the escapement pawl to fall into the next tooth when the power roll is revolved by hand, (by turning the motor coupling). (Fig. 2)

FIG. 2



- (b) The back space stop 1000565 must also be adjusted so the back space pawl 1000560 will swing under it when the safety latch is engaged. To test, hold down the carriage release lever and operate the back space pawl. (Fig. 3)

FIG. 3



- (5) Adjust the link 1000556 by means of the adjustable link 1090278 until the back space pawl link 1000559 has a wink of movement with the back space lever 1000550 when the back space pawl 1000560 is in its normal position. Too much play at this point will allow the carriage to be moved 2 spaces at a time. No play at all will prevent interlock from clearing back space pawl.
- (6) The back space interlock must not interfere with the back space pawl movement.

- (7) Check the operation with the power on.

REMOVAL

- (1) Unhook escapement pawl springs 1090160.
- (2) Unhook back space interlock spring.
- (3) Remove two screws from back space pawl bracket.
- (4) Unhook link 1000559

TO TEST Push the key lever locking bar 1000912 forward, press the back space key and turn the motor coupling by hand. The back space pawl will travel into the escapement rack and back up the carriage one space - just before the back space pawl reaches its stop you can hear an escapement pawl "click" when it drops into position. When the back space pawl is against its stop the cam unit should be engaged against the power roll about 1/2 inch from its high point or end.

The whole test can be seen by tipping up the machine and looking through the bottom to the back space pawl at the same time you are turning the power roll by means of turning the motor coupling with your thumb.

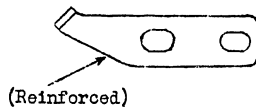
NOTE: To prevent a back spacer and carriage return assembly from locking up, bend the lip out on the pawl release lever, shown at point "a" on Fig. 1.

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #32

TO: ALL EWM SERVICEMEN

SUBJECT: BACK SPACE PAWL STOP #1000565

The Back Space Pawl Stop has been re-designed to give additional strength at the point where bending has occurred.



Back Space Pawl Stop #1000565

This part is interchangeable with the former design.

Return the stops in your stock for credit.

July 26, 1940

REVIEW QUESTIONS

1. What should be the first adjustment made on the back spacer mechanism?
2. How much clearance should there be between the back space pawl and the lug?
3. How is the final stop set?
4. What is the adjustment, when the back spacer goes two spaces instead of one?
5. How can the tying of back spacer and the carriage return be helped?
6. How can the final stop on the back spacer be made longer?
7. Where is the first place to check, if the back spacer cam is found to be rubbing the power roll?
8. What should be checked, if the back spacer skips in the same spot each time?

TYPE BASKET SHIFT

THE PURPOSE of the type basket shift is to raise or lower the type basket so as to print upper and lower case characters.

OPERATION Depressing the shift key 1000054 first raises the rear of the shift head 1000113 to engage the upper pin 1000115, then trips the shift cam 1001105 to lower the type basket from the lower to the upper case characters. When the shift key is released, the shift head 1000113 engages the lower pin 1000115, after which the cam trips again to raise the type basket for the lower case characters.

Shift head 1000113 carries an eccentric stud 1090294 which slides in a slot in the rear of the key lever 1000054. When the shift cam is tripped, shift head 1000113 is pulled forward by the cam unit, acting through the link 1014536 and shift mechanism lever to which it connects. This movement causes the shift toggle lever to rock on its stud and raise or lower the type basket.

The type basket is supported and guided by four flat springs 1000410 and 1000411 which permit free vertical motion and prevent horizontal motion of the type basket. In removing these springs only one must be removed at a time in order to retain the correct setting of the type basket.

The basket does not lock in position but is held against the stop brackets by the tension of the hairpin springs 1000123 and 1000126. The basket shift stop brackets 1000403 and 1000404 limit the motion of the type basket.

ADJUSTMENT

- (1) Type Basket Motion The motion is the travel of the basket when shifted. The adjustment for the proper motion is made by adjusting nuts 1090034 so as to increase or decrease the type basket travel. This adjustment must be made equally on both sides of the basket. Adjust the motion so that the feet of the small and capital case letters are in line. (nNnNnN)
- (2) Light Type or Bottom The type must be centralized on the platen so as to print with the same impression on top as on the bottom of the characters. The type is centralized by raising or lowering the type basket. Turning the basket shift stop screw 1000402 to the right raises the type basket.

Turning the basket shift stop screws 1000402 to the left lowers the type basket. Be sure the basket rests equally on both cushion washers 1090619.

TO TEST THIS ADJUSTMENT Strike up all capital letters and inspect for an even impression on the top and bottom of the characters.

CAUTION Whenever screws 1000402 are changed, it is necessary to check the clearance between the shift head (T lever) 1000113 on 1001509 assembly and the shift head (T lever) latch pins 1000115 on 1001414 assembly. (See drawing) Also check trip link 1000265 - from Universal bar and trip lever.

September 1, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #75

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS

SUBJECT: TYPE BAR SEGMENT SUPPORT ASSEMBLY - PART NUMBER 1019053

Steel is now being used for the type bar segment support on machines with serial number 71312 and up.

Several changes were made which affect former adjustments as follows:

- (1) The shift stop bracket #1019045 is offset and the guide bolt #1019042 is locked to the bracket. When setting the motion, the adjustment is opposite as compared with the former segment support adjustment. On the aluminum segment support the guide bolt moved with the support. The steel support guide bolt #1019042 is stationary and is locked to the shift stop bracket by lock nut #1090034.
- (2) The type bar fulcrum wire is held by means of six supports #1019050 and one clamp #1019049. The supports have square holes for the fulcrum wire and do not lock the wire, merely support it. The clamp has a (V) shaped hole which acts as a support and lock for the fulcrum wire.

Screw #1091483 is used to position the fulcrum wire and controls the rebound in the type bars. The center support does not have a positioning screw since we still use the segment spacer for our rebound control at this point (between #21 & 22 typebar).

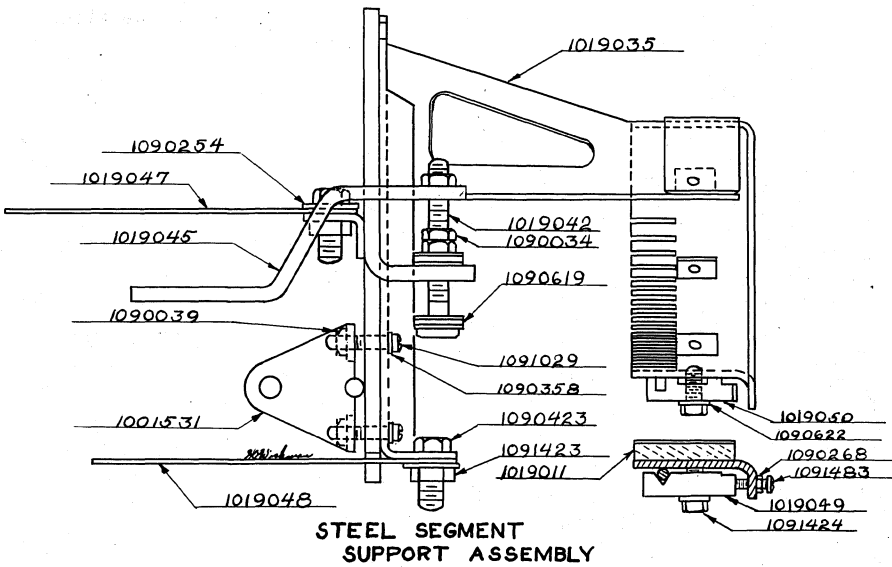
The rebound should be checked at each of the seven points using only two of the bars at each point.

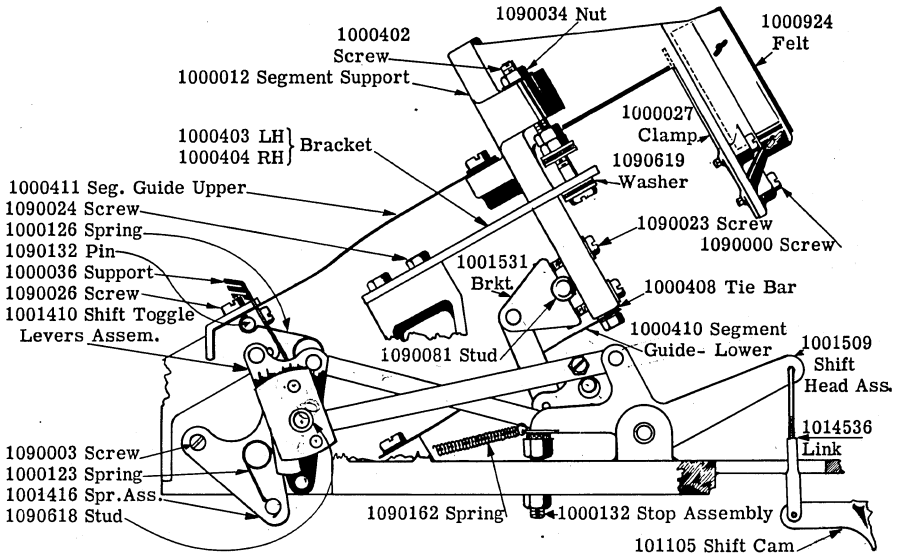
Stud #1091424 for locking the supports, should never be pulled up tight until the rebound adjustment is complete. Tighten the locking studs #1091424 from center to outside respectively and tighten the clamp stud last. The clamp is always located second from the right facing the machine.

Caution: (NEVER USE A BENT FULCRUM WIRE). A fulcrum wire which has been bent will cause a false adjustment and considerable trouble with the type bar toggles will be experienced.

HOWickman/mfh

R. F. Sheridan
EWM Manager, Customer Engineering

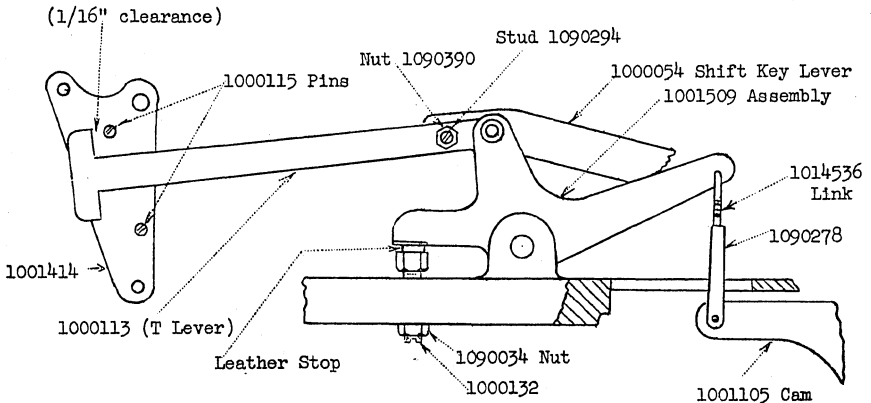




ALUMINIUM SEGMENT
SUPPORT ASSEMBLY

(3) Shift Head (T lever) Adjustments

- (a) With the basket in the small case position, remove the Power roll and check the distance between the shift head 1000113 and the latch pins 1000115 by depressing the shift key lever and moving the shift cam 1001105 by hand.



Repeat this test with the basket in the Capital case position.

With the motion set correctly, if the clearance is not equal between the T Lever and the pins when the basket is in upper and lower case positions, an adjustment on the shift toggle link bracket 1001531 must be made.

If the shift head has more clearance behind the upper pin than it has behind the lower, loosen lower screws 1090023 and tighten upper screws 1090023. Adjust these screws equally on both sides of the basket.

- (b) The clearance between the T lever and the pins should be approximately 1/16". Regulate this clearance by turning the stop retaining screw 1000132.
- (c) Adjust eccentric stud 1090294 so that as the key lever is depressed the hook on the rear end of the shift head 1000113 will safely engage the upper pin 1000115 before the cam is tripped.

When the key is released, the shift head 1000113 must safely engage the lower pin 1000115 before the cam is again tripped. Move the key very slowly up and down to check this with the power on.'

NOTE: Use a screw driver through the hole in the side of the base and a wrench on the locking nut 1090390 to make this adjustment. It is set correctly at the factory and should not be changed - do not disturb the setting unless the screw and nut appear loose.

- (4) Adjust the cam so that the release lever falls on the rear of the cam lug. See "Cam Units."

NOTE: To check the correct tension on springs 1000410 and 1000411, remove hair pin springs 1000123 and 1000126 and the basket should float about half way up between the washers 1090619.

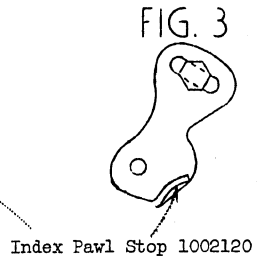
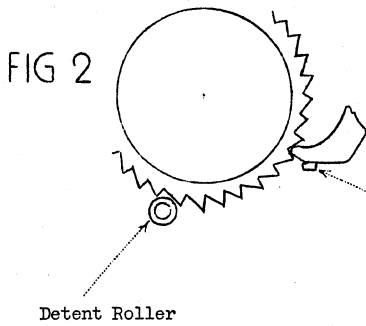
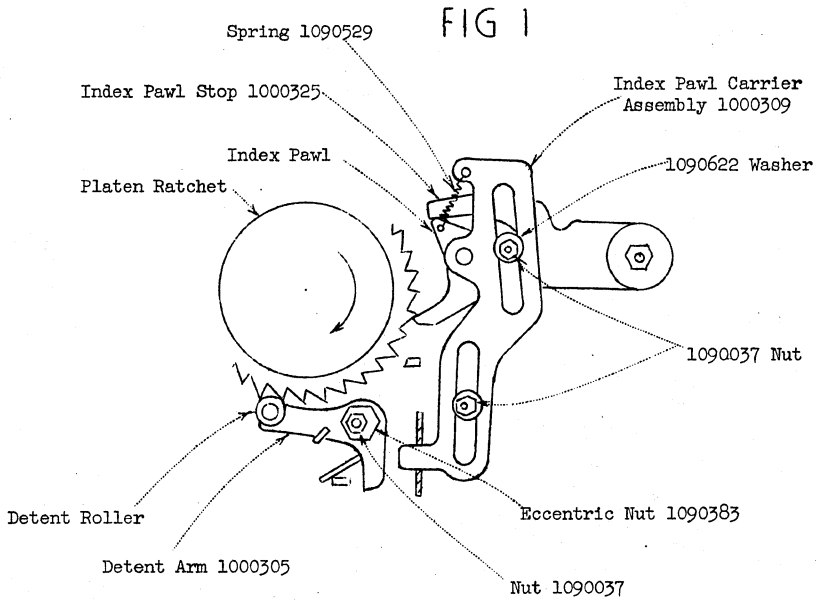
Weak springs will cause a slow acting shift.

NOTE: Check questions and answers Page 13 for a comparison between the new and old style shift mechanisms.

REVIEW QUESTIONS

1. What is the term called "motion"?
2. How much clearance between the two pins on the shift head and the "T" lever?
3. How is this clearance made equal?
4. How is the amount of tension governed on the four flat springs, which support the basket?
5. Are the springs on the shift toggle the same?
6. How far does the cam carry the basket?
7. If the basket failed to travel its full distance, where would the trouble apt to be?
8. How is "light on top or bottom" adjusted?
9. What is the close position for the eccentric screw to be in when starting adjustments?
10. How can a slow shift be adjusted to move faster?
11. Will the setting of the shift, throw off the escapement trip link?
12. If the cam trips and the basket failed to move, where is the trouble?
13. With the two hair pin springs off the shift toggle, and the basket does not come up to the half way position, where is the adjustment?
14. What is the correct adjustment on the eccentric to raise or lower the "T" lever?
15. What are the results from a grooved power roll on the basket shift?

LINE SPACE MECHANISM



EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #22

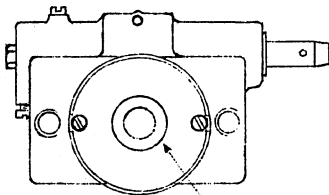
TO: ALL CUSTOMER SERVICEMEN

SUBJECT: NEW DESIGN: CLUTCH PULLEY, PULLEY SPRING AND WORM HOUSING COVER

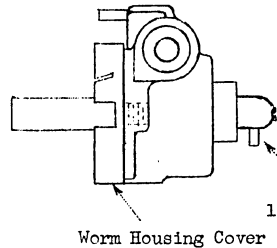
To improve our products further, the clutch pulley, pulley spring and worm housing cover have been redesigned. This enables a further standardization of parts in that the clutch pulley is the only part which must be changed for the various carriage lengths. Various carriage return speeds may be obtained by changing the clutch pulleys.

The pulley spring is assembled in the worm housing cover as compared with the former model where it was assembled in the clutch pulley.

WORM HOUSING ASSEMBLY - 1015089
11-1 RATIO



Washer .005 Thick
#1091186



Pin
1090890

Worm Housing Cover

The worm housing cover is not interchangeable as the bearings must be "line reamed" in assembly. Thus, when it is desired to change to the 15,000 series clutch pulley, the worm housing assembly #1015089 must be used for replacement.

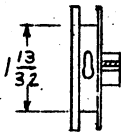
There are three clutch pulleys of different diameter giving three speeds of carriage return. These pulleys may be interchanged where it is desirable to obtain different carriage return speeds.

March 20, 1940

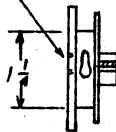
Pulley used on 12" machines	#1015079	1st speed return
" " " 16" & 20" machines	#1015356	2nd speed return
" " " 24" & 30" machines	#1015357	3rd speed return
" " " Lifting Platen "	#1015357	3rd speed return

Identification - 2 Notches

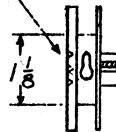
Identification - 3 Notches



1015079



1015356

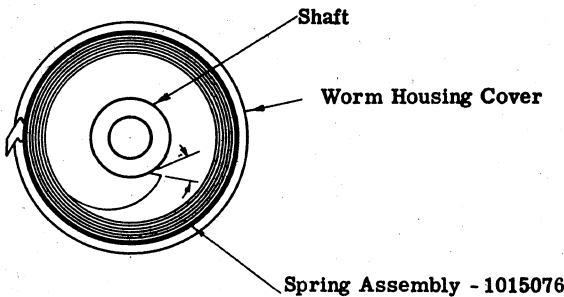


1015357

Adjustments

To connect the tape, wind the pulley until it is tight, then back it off approximately five turns. Make certain that with the carriage in the extreme left position the pulley allows the line index mechanism to come up against the stop. When the carriage is at the extreme right there must be no slack in the tape.

The spring when placed in the worm housing cover should be against the shaft as shown in the figure below.



Tip should be against the shaft. There should be an angle between the tip and shaft as shown at (a)

Advantages: On applications requiring the typing of a large number of carbon copies and a high impression indication setting, the carriage return speed can be reduced to normal by changing to a smaller diameter pulley thereby reducing carriage shock, strain on the tabular lever, paper slippage, etc.

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #30

TO: ALL EWM SALES AGENTS, PROVINCIAL MEN AND SERVICEMEN

SUBJECT: 12:1 RATIO WORM HOUSING ASSEMBLY

All Hektowriters, all Lifting Platen machines, and all Formwriters are now being equipped with a 12:1 gear ratio worm housing. The housing is identified by the number "12" stamped in the casting. This enables the motor to deliver greater power for those machines which carry a heavier load.

In cases where machines are "tying up" due to low voltage, the 12:1 gear ratio will provide additional power to overcome that lost by low voltage.

Worm Housing Assembly	#1016713	\$8.00
Worm Shaft	#1016714	\$3.00
Worm Wheel	#1016715	\$1.00

The motor speed is increased by the adjusting screw and impression indicator lever to obtain the correct power roll speed.

July 9, 1940

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #31

TO: ALL EWM SERVICEMEN

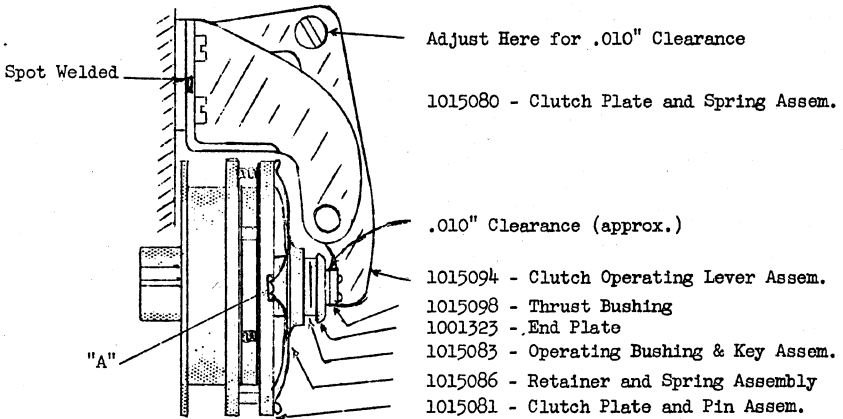
SUBJECT: IMPROVED CLUTCH PLATE AND SPRING ASSEMBLY #1015080

The improved clutch plate #1015081 is made of cast iron for better frictional qualities. There is a notch at "A" to hold the retainer and spring assembly #1015086 in position.

The spring and nut formerly used are now combined in one assembly #1015086 to provide a better means of adjusting the carriage return. The spring is riveted to the retainer. The spring tension is adjusted by turning the retainer and spring assembly. This provides an accurate adjustment.

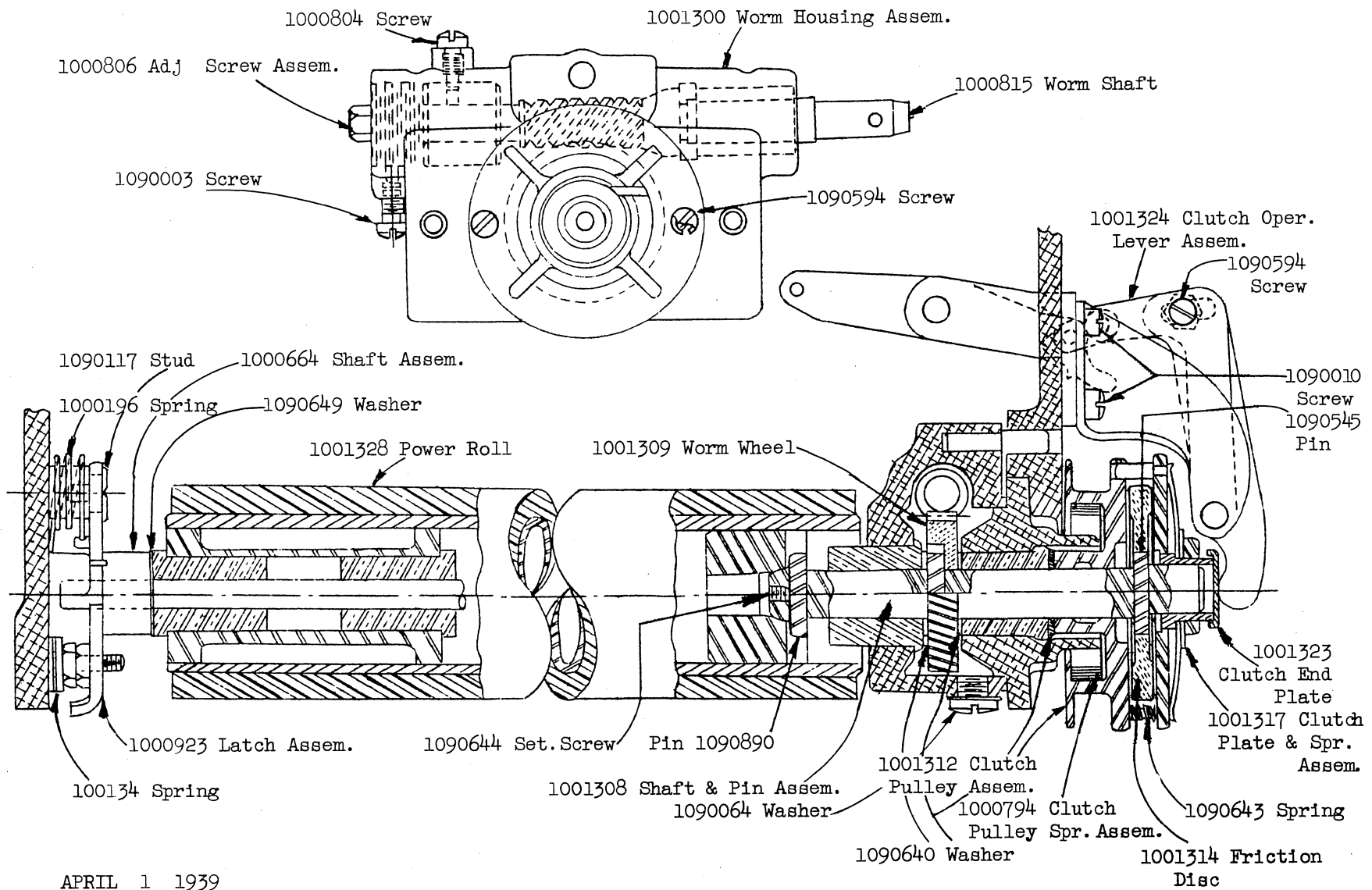
The thrust bushing #1015098 is to prevent wear of the end plate #1001323. This is a porous bushing and is lubricated with oil.

The clutch operating lever #1015094 is spot welded as shown in the drawing and has the end cut out to hold the thrust bushing.



Clutch Adjustment - By means of the screw on the clutch operating lever, set the clearance at the thrust bushing #1015098 to approximately .010". This allows the clutch to be engaged for the maximum length of time and thus gives a better carriage return action. This is important! Then, by turning the retainer and spring assembly, adjust the spring tension for the proper carriage return action. This provides an easier and more accurate means of adjusting the clutch.

July 12, 1940



APRIL 1 1939

CARRIAGE RETURN AND LINE SPACE

OPERATION The carriage return key trips the single lobe cam unit 1001103. The motion of the cam is transmitted through link 1000282 to the clutch toggle operating lever. The action of the clutch toggle causes pressure on the friction disc of the clutch pulley. The action of the toggle also sets the toggle knock-out lever 1000285.

The pressure on the friction disc causes the clutch pulley to be turned and wind the return tape. This causes the platen to be line spaced and the carriage to be returned.

The upper end of the tape passes over the pulley 1090436, mounted on the end of the line space hook lever assembly 1000310. The line space bell crank draws the index pawl carrier 1000309 down and at the same time index pawl which is part of 1000309 assembly catches a tooth of the platen ratchet and retains its hold until it is carried against a horizontal stop. This action causes the platen to be turned one or more spaces as determined by the position of the line space lever 1000917.

When the line spacing operation is completed the carriage moves to the right until the margin stop strikes the horizontal lug on the tabular lever. The margin stop rides over the toggle release lever which operates through link 1000739, bell crank 1014252 and link 1000288 and the toggle knock out lever 1000285, to release the clutch operating toggle and free the clutch 7 to 9 spaces before the end of the return is reached.

The escapement pawls are pushed out of engagement with the escapement rack during the carriage return by means of the pawl release lever to eliminate the rasping noise caused by the pawls dragging over the teeth.

There is a coil spring inside the return tape pulley which maintains a slight tension on the tape to wind the surplus tape when the carriage is returned by hand.

LINE SPACE

OPERATION As the index pawl carrier is pulled down by the action of the carriage return tape, index pawl moves forward to the position shown in Fig. 1 then slides down the tooth and rotates the platen to the position shown in Fig. 2. At this point the detent roller must be resting between two teeth, as shown, to prevent further rotation of the platen. The pawl stays in this position against the stop while the carriage is returned.

TO TEST the action of the line space mechanism, move the carriage to the extreme right. Pull the return tape slowly by hand until the index pawl is in the lowest position, holding the platen knob with the left hand to retard the line space action so as to watch it more closely.

ADJUSTMENT (Eccentric Nut 1090383)

- (1) Loosen the nut 1090037 on the detent arm and adjust the eccentric nut 1090383 which moves the detent roller forward or backward. This changes the relative position of the ratchet teeth with the index pawl. Adjust the eccentric nut so the index pawl first touches the ratchet at the point shown in Fig. 1. Be sure to tighten the lock nut.
- (2) (Index Pawl Stop) Line space the platen as suggested above for testing and at the end of the pawl movement release the tape slowly and notice if the platen continues to move in the same direction or moves backward from its motion of travel. If it moves in the same direction, the stop is too high. If it moves backward, the stop is too low. Adjust the stop so there is no movement of the platen when the tape is released.

To obtain the correct setting the stop is adjusted by loosening the two nuts holding the stop to the carriage frame and by moving the stop back in the slot to lower it and forward to raise it. (Fig. 3)

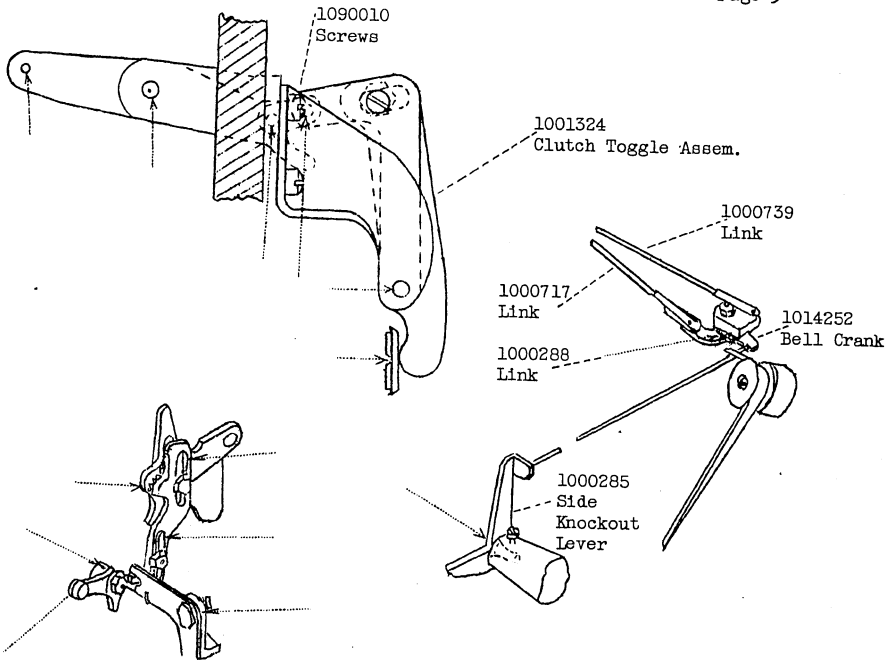
CARRIAGE RETURN

ADJUSTMENTS The chief reasons for adjusting the carriage return and line space are:

- (1) The carriage fails to return or line space.
- (2) Clutch locks machine.

The following are ways to correct trouble:

- (1) Oil bearing points shown by arrows.
- (2) Check 1001323 end plate for wear. If end plate shows wear, replace it.
- (3) With the clutch toggle locked up, run the carriage slowly to the right by hand until the margin stop engages the toggle knockout lever 1014243. The toggle knockout lever should be released when the engaging edge of the margin stop is 1/8 inch from the top of the incline of the knockout lever. (See Fig. 1) Adjust the link 1000739 until the knockout lever is released as described above.

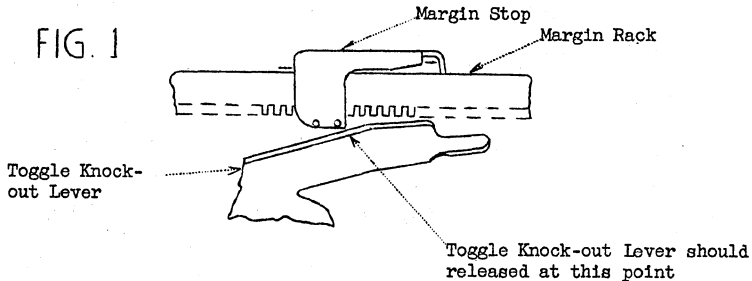


ARROWS TO OILING POINTS

- (4) Remove the 1001314 friction disc from the clutch and reface it by rubbing it back and forth on a piece of fine sandpaper placed on a flat surface. Make sure that the disc is not glazed or oil soaked before you replace it. Opposite sides of the disc must be parallel.
- (5) Install a new style 1014243 clutch toggle knock out lever on the rear rail and adjust the lever so it will release the clutch toggle a little less than one inch from the stop on the tabular lever when tried by hand (i.e. Pica 9, Elite 10 spaces instead of 7, 8 or 9 as formerly done). After this lever has been installed the

May 1, 1939

link that pushes the escapement pawls out of the rack should be adjusted so the pawls will be as close to the rack as possible (one half turn shorter on link 1000717 should cause pawls to drag.)



- (6) Adjust the clutch by tightening or loosening the clutch operating lever. Place two thicknesses of 16 lb. bond paper between the end plate and the operating lever (when the clutch toggle is unlocked and down against its bottom stop). If you do not wish to use paper, use a .008 thickness gauge. Tighten the screw and nut with the thickness gauge in position. The clutch pulley should have a slight drag at this setting. Remove thickness gauge and the clutch should be set correctly. The carriage return should not be positive on short returns when set for triple line spacing.
- (7) Check and set the cam unit.
- (8) Examine the carriage return tape. It should pass over the roll on the hook lever assembly squarely. The roller should turn freely.
- (9) Make sure the platen turns freely on its bearings. To test, hold the detent roller down - away from the platen ratchet with a screw driver and spin the platen. Oil bearings if necessary. If the platen then shows a bind, it is usually caused from a sprung carriage frame due to the margin and tabular racks springing the frame. This can be eased by loosening the inside and outside nuts on the right end of the racks and tightening them evenly again.
- (10) The bind in the index pawl carrier may be caused by the nuts 1090037 having been turned too tightly so as to force the washers against the pawl carrier. Reverse the washers.

- (11) If the machine continues to lock up, examine the rivet (for wear) located inside the base on the 1001324 clutch operating lever assembly. If the rivet shows wear, replace the whole operating lever assembly.
- (12) Check and set the cam unit.

A noisy clutch is caused by either a bad bearing or play in the worm wheel shaft. Remove this play by using shim 1091079 or 1091080 next to the fibre worm gear.

ADJUSTMENTS IN SEQUENCE To remove 1001314 friction disc:

- (1) Remove the clutch cover.
- (2) Loosen screws 1090010 and the clutch parts can be pulled off the shaft. There are three small coil springs 1090643 that may drop off the short pins on the 1001312 clutch pulley and get lost if the parts are removed carelessly.
- (3) Remove and reface the 1001314 friction disc.
- (4) Reverse the procedure, turning the clutch plate and spring assembly 1001317 until the pins fit into the holes in the pulley assembly 1001312.
- (5) Before tightening screws 1090010 make sure that the end (inside the base) of the clutch operating lever assembly 1001324 goes over (on top of) the 1000285 lever.

To adjust the whole movement:

- (1) Disconnect link 1000739 from the toggle intermediate lever 1014252. It is not necessary to remove the rear cover plate to do this. The link can be spread with the end of a narrow screw driver run through the tabular link opening in the rear cover plate.
- (2) Adjust cam unit to the power roll 1001328.
- (3) With the clutch toggle locked up, run the carriage slowly to the right by hand until the margin stop engages the toggle knockout lever 1014243. The toggle knockout lever should be released when the engaging edge of the margin stop is 1/8 in. from the top of the incline of the knockout lever. (See Fig. 1) Adjust the link 1000739 until the knockout lever is released as described above.
- (4) Adjust the pawl release lever link 1000717 to a point where the escapement pawls can be just heard dragging against the rack when the clutch toggle is locked up. Then lengthen the adjusting link a full turn so as to be sure the escapement pawls will not drag on the escapement rack when the carriage is returned. (On machines where pawl release link 1000717 has been discontinued, refer to page 12 of this section.

If the escapement pawls are held out too far by the pawl release link, the clutch toggle will be prevented from locking safely past center and will cause the carriage to fail to return fully to the margin stop.

(5) (a) Test carriage return movement.

Adjust the clutch by tightening or loosening the clutch operating lever. Place two thicknesses of 16 lb. bond paper between the end plate and the operating lever (when the clutch toggle is unlocked and down against its bottom stop). If you do not wish to use the above, have the line spacing lever set at double spacing, the carriage should return when spaced from 6 - 10 spaces out from the left hand margin. At triple spacing, it should fail when spaced out 6 - 10 spaces.

(a) On the clutch operating lever assembly
loosen screw 1090003.

(1) To tighten - move the top of the lever with the elongated slot to the outside (away from the machine) and tighten screw.

(2) To loosen - move top of the lever with the elongated slot (toward the machine) and tighten screw.

(6) Inspect the carriage return tape 1000390 at the point where it goes over the roller on the hook lever assembly 1000310. Make sure the roller turns freely. Inspect the condition of the small index pawl spring 1090529 fastened to the index pawl 1000327.

(7) Margin rack adjustment (see "Margin Stop Rack")

(8) Adjustment of the ear of toggle knock-out lever (see "End of toggle knock-out lever")

On machines equipped with the late style pawl release lever, adjust the knockout lever 1014243 the same as before, having a wink of movement on the knockout finger when the clutch toggle 1001324 is in the raised or locked position. Adjust the eccentric nut.

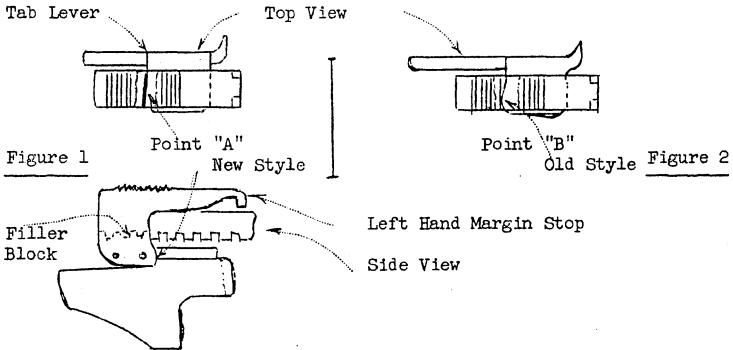
MARGIN STOP RACK Adjust the margin rack by means of the nuts on either end which hold it to the carriage, so that the carriage will drop back a certain distance after striking the stop. This distance is gauged by moving the carriage slowly until the margin stop touches the stop on the tabular lever at which point an escapement pawl should drop into the escapement rack making an audible click.

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #14

TO: ALL EWM SALES AGENTS, PROVINCIAL MEN AND SERVICEMEN
SUBJECT: LEFT HAND MARGIN STOP ASSEMBLY

Machines have been sent to the field with the new style left hand margin stops since last July and reports indicate that they have helped to minimize tabular lever breakage.

Therefore, when replacing a tabular lever we suggest you check the left hand margin stop to see if it is a late style; if not, install one. You can determine this by examining the filler block. If it has been ground at an angle so that when contact is made, the lug on the tab lever and margin stop are parallel (Point "A", Figure #1). The old style margin stop was not ground at an angle, so consequently only point contact was effected as shown in Figure #2, Point "B".



December 8, 1939

This distance is sometimes referred to as "overbank" and should be approximately 1/2 a letter space. If the carriage does not have enough "overbank" it will lock up; if it has too much "overbank", an uneven left hand margin will be the result.

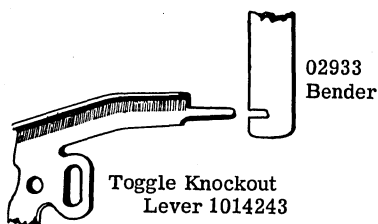
END OF TOGGLE KNOCKOUT LEVER The purpose of this tip (See Fig. 2) is to prevent the clutch locking when the tabular and carriage return are operated at the same time.

This tip is adjusted by bending. If it is not high enough the clutch will lock when the carriage return and tabular are operated at the same time.

If the tip is too high the toggle will not lock safely, i.e., the stop will not come against the screw head, and the carriage will fail to return all the way to the margin stop.

TO TEST After the carriage return adjustments are correctly made, hold the carriage from moving and touch the tabular key; move the carriage to the right until it is stopped by a tabular stop; touch the carriage return key. If the clutch locks, the tip must be bent higher.

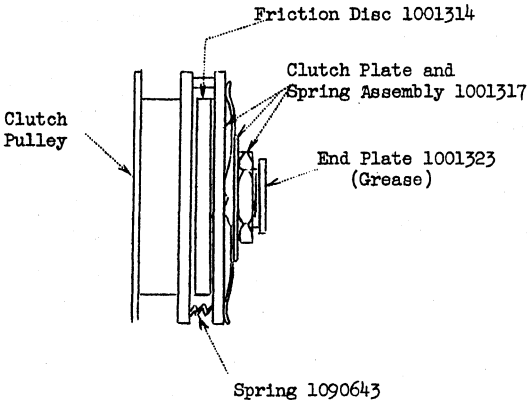
If partial carriage returns are being experienced, disconnect link 1000739 and test carriage return under power. If carriage returns all the way, your trouble is somewhere on the rear rail and not in the clutch. It is probably in the adjustment of the pawl release lever or in link 1000739.



CLUTCH PULLEYS The clutch pulley shown in Fig. 1 is used on machines 23000 series and up. This type of pulley has two friction surfaces acting against the friction disc. The springs, 1090643, keep the outer clutch plate away from the friction disc when the pulley is idle.

April 19, 1946

FIG. 1

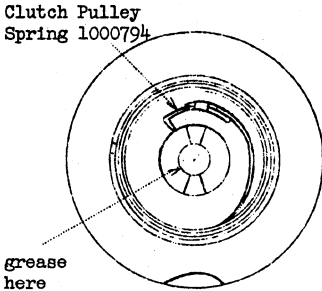


1001312
Clutch pulley for
12, 24 and 30 inch
carriage machines

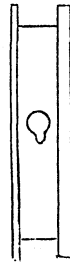
1002448
Clutch pulley for
16 and 20 inch
carriage machines

TO REMOVE the friction disc or clutch pulley, disconnect the carriage return tape and loosen the screws 1090010, which hold the clutch operating arm 1001324 to the side of the base, until the pulley assembly can be withdrawn. When replacing the pulley, make sure the clutch operating lever is over the intermediate lever 1000285 located inside of the frame, before tightening screws.

FIG. 2



for 12, 24 and 30"
machines



for 16 and 20"
machines

REPLACEMENT OF THE CLUTCH PULLEY SPRING 1000794 The spring must be wound as shown in Fig. 2. The end of the spring must be formed so it will press against the pulley hub. Form the spring by rolling the end between the thumb and index finger. If the spring is not properly formed, it will come out of the machined slot in the clutch housing and allow the return tape to become slack.

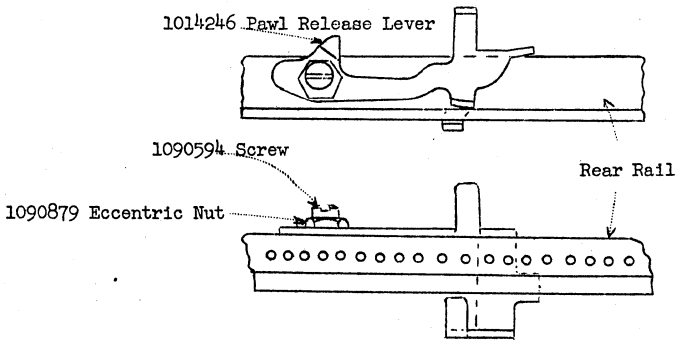
To connect the carriage return tape to the clutch pulley, first move the carriage to the extreme left position, (using the margin release) and then wind the pulley until the spring is tight before attaching the tape.

IMPROVEMENT--ESCAPEMENT PAWL RELEASE LEVER #1,014,246

MACHINES AFFECTED: All models

REASON: To prevent irregular margining when the carriage return key is used repeatedly, a redesigned Escapement Pawl Release Lever #1,014,246 has been added to the rear rail.

This part removes the escapement pawls from the escapement rack when the Toggle Knockout Lever Assembly is locked up by the carriage return movement. It performs the same duty as link 1000247 which was superseded by 1000717 now removed.



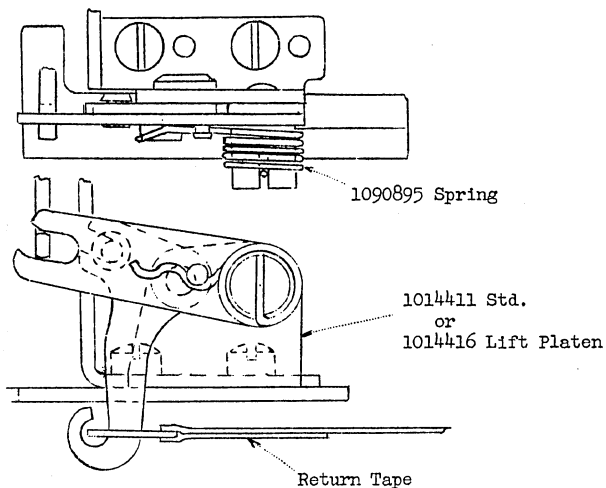
ADJUSTMENT: Loosen screw #1,090,594 and turn eccentric nut 1,090,879 until the escapement pawls are taken out of the escapement when the carriage is being returned. The escapement pawls should clear the teeth on the escapement rack by about .020" - not over.

IMPROVEMENT--RETURN TAPE HOOK LEVER ASSEMBLY

MACHINES AFFECTED: Assembly #1,014,411 Standard 12 & 30 inch Carriages only
Assembly #1,014,416 Lift Platen Carriage 12 inch only

REASON: To reduce service on the line space mechanism and to lengthen the life of carriage return tapes, assembly 1000310 Return Tape Hook Lever is being superseded by assembly #1,014,411 for standard carriages and #1,014,416 for Lift Platen carriages. They can be installed in machines now in the field, using the same mounting screws.

Carriage Return Tapes without the rubber end must be used with these assemblies.



TO INSTALL:

- (1) Screw the assembly to the bottom of the carriage.
- (2) Install the carriage return tape, hook it up.
- (3) Install spring with the closed end of the coil toward the front and the end pointing up. Hook the open end under the stud. Be sure to push the coiled end well into the slot of the mounting stud.

May 1, 1939

Section 11

REVIEW QUESTIONS

1. At what part of the carriage return, does the line spacing take place?
2. How is the clutch pulley spring formed?
3. What is the difference between a 12" pulley and a 16" pulley?
4. Why should the links on the rear rail be disconnected, when completely adjusting clutch?
5. What are the results from a worn clutch toggle assembly?
6. What are the results from a worn slot in the friction disc?
7. How can the extra slack in the carriage return tape be removed if the spring is completely coiled up?
8. What is the correct adjustment on the toggle knock-out link?
9. How far out of the escapement rack, should the escapement pawls be adjusted?
10. At what point on the ratchet, should the index pawl enter the tooth?
11. What are the adjustments on the detent arm, and give its purpose?
12. In case the clutch toggle does not pass the center line, name points to check?
13. Where can the click in the clutch assembly be located?
14. What is the purpose of the ear on the toggle knock-out lever?
15. Why does the knock-out lever have a hair pin spring on the bottom part?
16. What is the effect of a weak spider spring on the clutch plate?
17. If the left hand margin cannot be held when line spacing repeatedly, what parts should be installed?
18. What is the proper adjustment to have on the margin rack for tolerance between the tab lever and the margin stop?

September 11, 1941

EWM CUSTOMER SERVICE DEPARTMENT
LETTER OF INSTRUCTION #55

TO: ALL EWM SALES AGENTS, IBM SERVICE SUPERVISORS, AND
EWM CUSTOMER SERVICEMEN

SUBJECT: CLUTCH RATIOS

The factory is discontinuing the marking of clutch housings to show the reduction ratio.

Any clutch ratio can be determined by observing the number of turns the motor coupling requires in order to rotate the power roll one complete revolution.

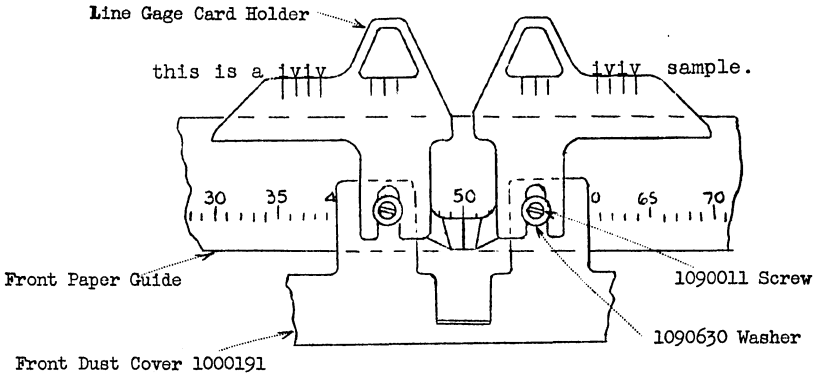
For Example: On a 12:1 ration clutch, after marking the power roll and turning the motor coupling twelve revolutions, the power roll should return to its original position, having completed one revolution.

R. F. Sheridan
EWM Customer Service Manager

JWLenhart/jfs

LINE GAGE CARD HOLDER

PURPOSE: To hold cards and multiple copies close to the platen. To line up copies when a correction is necessary in order that the character will strike in the exact position of the original character. Also to enable the operator to locate a desired writing position.



ADJUSTMENTS: Strike up several characters and align the small vertical lines on the line gage card holder to the center of the character as described in the above sketch. The two screws 1090011 can be loosened and the card holder moved in any direction because of the oversize slot. The card holder should be formed so that the clearance between the platen and the holder will be about $1/32$ ".

REPLACEMENT: It is advisable before assembling line gauge card holder to see if graduated lines on card holder line up with the graduation lines on the front scale plate (check by placing against front scale plate). If it does not, it can easily be reformed by hand.

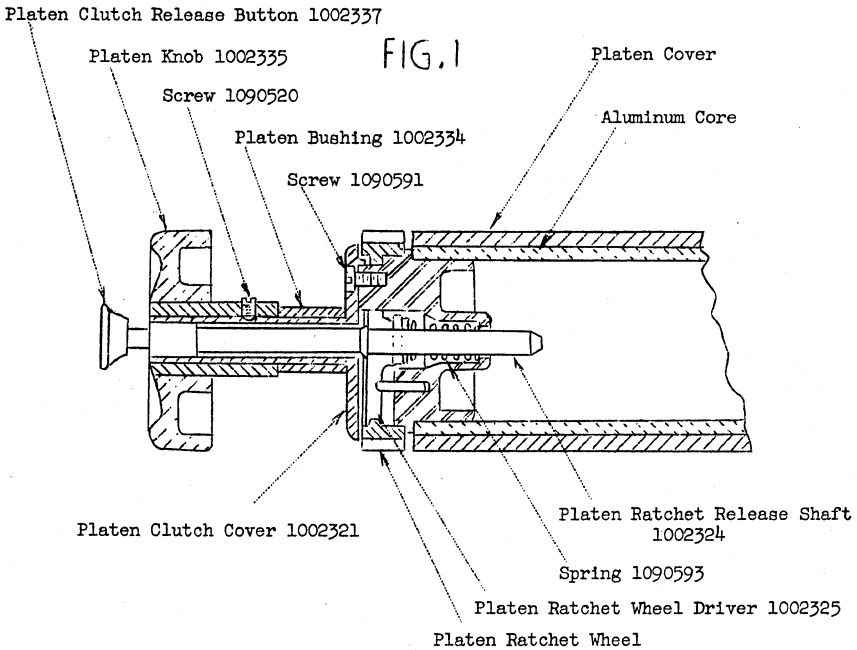
May 1, 1939

PLATENS

The platen consists of an aluminum tube over which a rubber tubular cover is pressed. The cover is held to the core by a plastic cement. End plugs are pressed into the core to which are assembled shafts for the platen bushings and knobs.

The left end of the platen contains the variable line space mechanism which is shown in Fig. 1. Any of these parts can be readily removed or replaced if necessary.

To take the variable line space mechanism apart, unscrew the platen clutch release button, loosen the two set screws on the platen knob and remove it. Remove the four screws 1090591 holding the platen clutch cover 1002321 to the platen.



When assembling or inspecting the platen make sure the bushings turn freely on the platen shafts.

May 1, 1939

AVAILABLE PLATENS AND THEIR USES The various platens and their uses are listed below. The numbers referred to will be found on the right end of the platen cover.

It is difficult to establish definitely the number of carbon copies that may be made on any grade of platen due to variations in paper, thickness of forms, size and condition of the type, and the quality of carbon paper used.

The following list and general description will help in determining what platen to use for a given application. All platens are available as listed below for both the standard and the lifting platen carriage.

The Q-1 PLATEN is intended for general correspondence and up to five carbon copies. The core is a heavy wall tubing and tends to decrease typing noise.

The #3 PLATEN is a hard platen of standard diameter. This is usually satisfactory for work up to nine copies, but due to the increased over-all diameter with that number of carbon copies "over-printing" may occur in some places. By "over-printing" is meant that there may be a shadow over the character and a platen of smaller diameter is needed.

The #4 PLATEN is a hard platen 1/32" undersize in diameter. This platen is satisfactory for carbon copy work where from 8 to 12 copies are required.

The #5 PLATEN has a special grade of rubber adapted to typing on MULTILITH PLATES. This platen may also be used for general correspondence but a #Q-1 platen is to be recommended.

The #6 PLATEN is 1/32" smaller in diameter than standard, but has the same grade rubber as the #Q-1 platen. This platen is standard equipment on IEWM Bill Writing Machines and gives satisfactory results with five to ten carbon copies using Gothic or large Pica type.

The #7 PLATEN is a hard platen 1/16" smaller in diameter than standard. This platen is usually used for Bill Writing work where ten or more copies are required, or in cases where extra thick forms are used, having a thickness of 1/32" or over. In such cases a sample form should accompany the order so that the platen may be properly adjusted at the factory.

NOTE: The number on the right end of the platen denotes the size of the platen and the hardness of rubber used. The same system is used with lift platens. (see price parts list)

May 1, 1939

When ordering platens specify:

- (a) Platen number i.e., 1002382 (for 12" quiet platen)
- (b) Number of teeth on the ratchet.

Example: 1002382 -- 33 teeth, quiet platen assembly. (or see parts catalog for numbers)

PLATEN RATCHETS The number of lines per inch of writing is determined by the number of teeth on the platen ratchet and the setting of the line space lever.

Platens are supplied with a 33 tooth ratchet (6 lines to the inch for single spacing) unless otherwise specified. Other ratchets for special line spacing are available or can be made on order.

If the number of teeth on the ratchet cannot be accurately determined to give the line spacing desired, send a sample of the spacing to the factory. If the form is a multiple copy form, send a complete set with carbon paper as the number of sheets and thickness is a determining factor.

The following chart lists the number of special parts necessary to install the corresponding ratchet. The number of lines to the inch for a certain setting of the line space lever is also given.

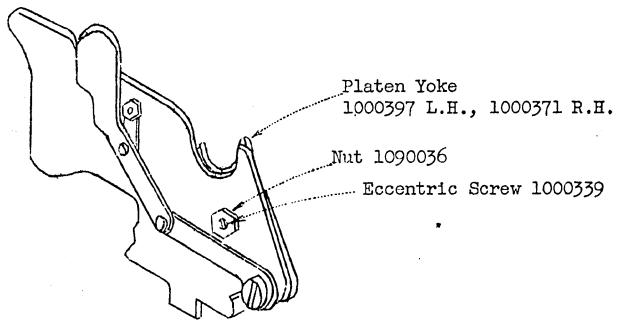
For adjustment of the ratchet after installing, see "Line Spacing."

Number of Teeth on Platen Ratchet	Setting of the Line Space Lever			Number of Lines to the Inch	Special Parts Necessary
29	1			5-1/4	Detent Arm Assem. 305-29T
33	1			6	
		2		3	
			3	2	
44	2				Detent Arm Assem. 305-29T
				4	
55		2		5	Detent Arm Assem. 305-62T Index Pawl Carrier 309-62T Index Pawl Stop 325-62T
62	2			5.6	Detent Arm Assem. 305-62T Index Pawl Carrier 309-62T Index Pawl Stop 325-62T
		3		3.8	
			4	2.8	
66	2			6	Detent Arm Assem. 305-62T Index Pawl Carrier 309-62T Index Pawl Stop 325-62T
		3		4	
			4	3	

PLATEN ADJUSTMENT Ring and Cylinder. The platen is called a cylinder. The flat surface on the segment is called an anvil or ring. The purpose of the ring is to prevent over-printing or to give the type bars a stop, so the type will not emboss the paper excessively or cause the characters to be blurred.

The type bars will emboss the back of the paper if the platen is too far forward. The type bars will print too lightly if they strike the ring harder than the platen, caused by the platen being too far back.

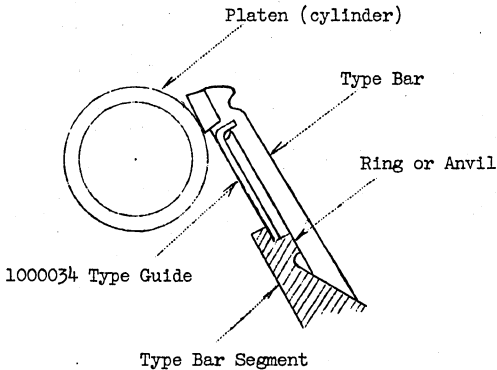
The platen rests on two yokes, 1000397 and 1000371, which are adjustable either forward or backward by eccentric screws 1000339, located on each end of the carriage frame.



Left End of Carriage Frame

To secure good results on any application it is necessary to have the platen parallel in relation to the type, that is, so the type strike with the same impression on both ends of the platen. The period and comma are good characters to use when checking the platen for being parallel.

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TO ADJUST THE RING AND CYLINDER

- (1) Insert a piece of paper and tear off a piece of the corner about 1/2" wide and 2-1/2" long.
- (2) Place the piece of paper between the cylinder and the type and hold the type bar against the platen with the fingers below the ring. (Place the paper between the ribbon and the platen) Pull the paper out slowly so as to get the feel of friction at that point.
- (3) Place the paper between the type bar and the flat surface on the segment (ring), pulling it out slowly so as to get the feel of friction at this point. Have the fingers near the type head when checking this adjustment.

The type bar should touch the segment with a little more pressure than it does the platen. Try this adjustment on both ends of the platen, using the same bar. Try several bars, especially those with a large type area, so as to get an average setting.

Turn the eccentric screws 1000359, moving the platen yokes 1000397 and 1000371 forward or backward until the correct setting is obtained.

This adjustment must be made with great care if good typing is to be expected.

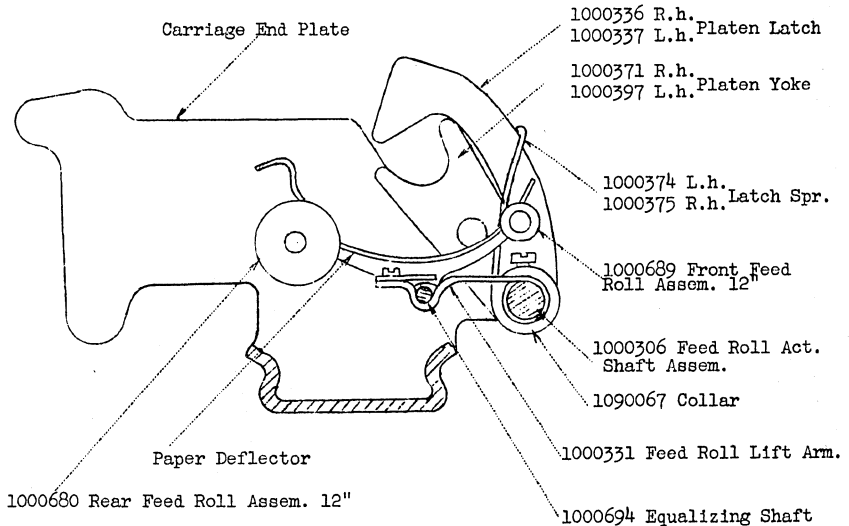
If the application on which the machine is installed requires the typing of a number of carbon copies, the ring and cylinder must be adjusted to that number of copies.

In cases where the machine is to be used for a single copy or for such work as stencil writing and also for manifold work, it may be necessary to use a standard and an undersize platen to obtain the best results.

PAPER FEED MECHANISM

The paper is inserted into the carriage between the platen and rear feed roll 1000680 and is guided towards the printing point by the paper feed deflector and front feed roll 1000689. The paper is held firmly against the platen by pressure of the paper feed rolls 1000680 and 1000689 and exerted from springs 1000374 and 1000375 through the shaft 1000306 and feed roll lift arm 1000331. The pressure can be increased or decreased by shaping the platen latch springs 1000374 and 1000375.

The feed rolls are mounted on a flexible paper deflector to form a unit assembly held in position on the shaft 1000694 which fits in lever 1000331.



ADJUSTMENTS To prevent the paper from slipping. This is usually caused by lack of pressure of the feed rolls against the platen. To increase this pressure unhook the platen latch springs 1000374 and 1000375 from the platen latches. With a spring hook, draw the springs down between the feed roll actuating shaft 1000306 and the carriage frame. Straighten the arms of the springs by pulling downward; this will wind the coils more closely around the collar and they will contact the platen latches at a higher point when replaced. Adjust both springs so the tension will be about equal.

Keeping the platen and feed rolls clean will also help slippage. Use Carbon Tetrachloride or alcohol.

There is a limit as to the amount of feed roll pressure that can be applied. If the carbon paper is soft, additional pressure will cause the carbon paper

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to mark the copy sheets. If this condition exists, the customer must be expected to do his part by using a harder grade of carbon paper.

To Prevent Stencils, Carbon Paper or Thin Tissue from "Treeing" or Wrinkling. Examine the feed rolls for freeness and end play. The feed rolls should turn freely and there should be no end play or side play at the bearing points. Adjust the bearing screws and tighten the lock nuts. Decrease the pressure of the feed rolls against the paper by pulling forward on the platen latches 1000336 and 1000337. This will slide the spring arms down so as to contact the platen latches at a lower point. Care must be used not to weaken the pressure more than necessary.

On long carriage machines instruct the operator to insert the stencil so it is held by only one set of feed rolls to further reduce wrinkling.

OTHER SUGGESTIONS FOR THE CORRECTION OF PAPER FEED TROUBLES ARE LISTED BELOW:

- (1) Examine the paper feed roll actuating shaft 1000306 for side play. Sometimes the collar 1090067 loosens and slides on the shaft. This would allow the whole assembly to have side play. To tighten, loosen the screw a little and slide the collar against the platen latch and tighten the screw. There is a flat surface on the shaft to hold the set screw that goes through the collar.
- (2) Examine the deflector for signs of friction caused by the paper rubbing on it. The best way to check the way the deflector is formed is to hold the deflector by the equalizing shaft, place the platen in it and spin one of the knobs. The platen should turn freely on the feed rolls. By turning the platen and deflector around and by holding it up to the light you can see if it needs re-forming and can see the exact spot if it does. The deflector can be re-formed by hand. Sometimes the outside edges, where the deflector protrudes over the front feed rolls, become straightened or turned up.
- (3) Try to feed in fifteen sheets of thin paper. Then release the feed rolls and see if there is freedom to straighten this amount of paper. If you do not have this freedom you can make this correction by bending down the feed roll lift arm 1000331 until it almost touches the carriage frame, with the release lever in the release position. This will give the maximum clearance for straightening the paper.
- (4) The clutch should be adjusted so that when the carriage returns to the margin stop, the impact will be as light as possible.
- (5) Examine the platen for freedom. There may be a bind caused by the nuts on the margin rack or the tabular rack not being tightened evenly. This would spring the carriage frame, putting a bind on the platen bearings. Try the platen for freedom, holding the detent roller down from the platen ratchet and with the paper release lever in the forward position. The platen should spin freely.

- (6) The equalizing shaft 1000694 should be parallel with the actuating shaft 1000306, also perfectly level in order that even pressure can be obtained on the outside rollers.
- (7) Check the deflector for turning straight. Hold deflector in hand and place platen in the center and spin platen. It should not travel either way, but perfectly straight. Twist deflector to correct.
- (8) Check the edges of the feed rolls for being rounded off. Use a piece of emery paper to correct.
- (9) On stencil applications, adjust the feed roll pressure as light as possible, and even up the pressure on each rubber roll.
- (10) Insert stencil to have maximum coverage by feed rolls. Long carriage machines insert either on right or left side.
- (11) Raise paper table by loosening screws 1090013 on each side and tilting paper table back. This allows stencil to be inserted at a different angle.

The correct feed roll pressure is tested by inserting a tension strip between each outside rear roller and turning the platen two spaces.

Adjust the Feed Roll Tensions as Follows:

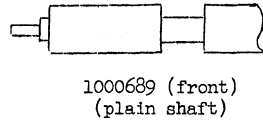
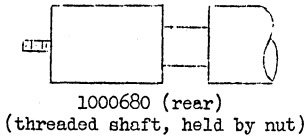
12"	3 - $3\frac{1}{4}$ lbs.
16"	2 - $3\frac{3}{4}$ - 3 lbs.
20"	2 - $2\frac{1}{4}$ lbs.
24"	1 - $3\frac{3}{4}$ - 2 lbs.
20"	$1\frac{1}{2}$ " - $1\frac{3}{4}$ lbs.

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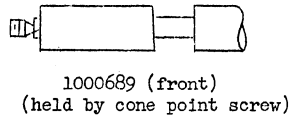
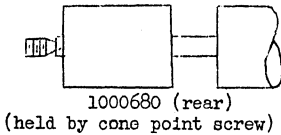
PAPER FEED ROLLS

There are three types of feed rolls which have been used all carrying the same number. This makes it necessary to specify the type of roll needed as well as to give the part number when ordering feed rolls.

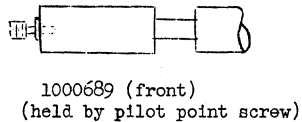
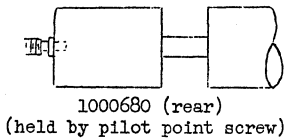
Style 1



Style 2



Style 3



Neoprene Feed Rolls and Neoprene Paper Bail Rolls are available for use with wax stencils. The platen contacts the stencil backing sheet but the feed rolls and paper bail rolls come in direct contact with the stencil, and thus have a tendency to swell due to the wax in the stencil.

It is advisable on stencil cutting machines to suggest washing the platen and feed rolls off each night. Also insert a sheet of paper between the feed rolls and platen at night to prevent wax from getting on the platen, which will cause the rubber to become spongy.

REVIEW QUESTIONS

1. What is the proper feed roll tension for a 12" machine?
2. What are the effects of a glazed platen?
3. What should be checked, if the carbon marked the manifold copies on each line space?
4. How many different types or styles of feed rolls are there?
5. How much end play should there be in the feed roll deflector?
6. What are the results from using swollen feed rolls?
7. What should be the clearance between the deflector and the platen in the released position?
8. Why should the platen turn straight with the deflector?
9. How much feed roll tension should there be in stencil writing?
10. What are the causes of stencil wrinkling?
11. Why is the International Electric Writing the best machine for stencil writing?
12. How can the proper speed be determined for making manifold copies?

MARGIN RELEASE

THE PURPOSE is to permit writing beyond the margin stop setting at either end of the writing line.

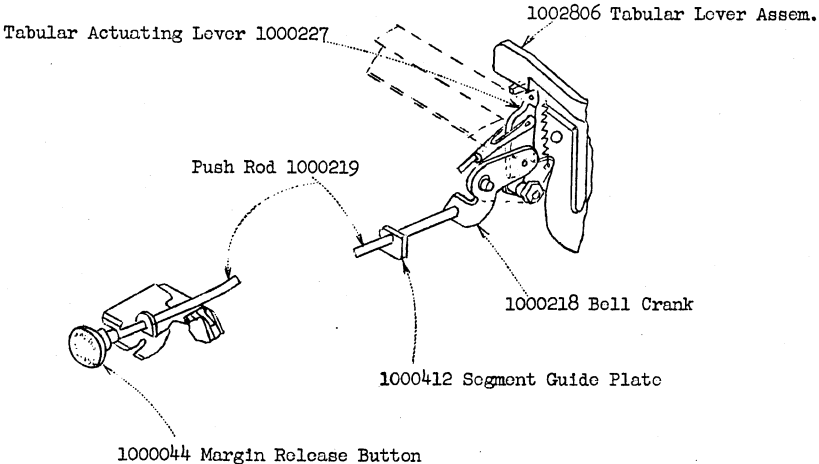
OPERATION When margin release button is pushed in, it operates through bell crank 1000218 and tabular actuating lever 1000227 to raise the left hand end of tabular lever 1002806 and lower the right hand end (which carries the horizontal lug that lies in the path of the margin stop) so that the margin stop can ride over the top of it.

NOTE: When the margin stop is set on the right side, say at 60, and the operator finds it necessary to use margin release, the clutch will not return the carriage to the left margin stop. It only goes about 1/2 way, and the carriage return key must be used again, leaving the platen indexed twice for one complete return. Some operators expect a service man to correct this. This is inherent in the design and cannot be corrected by the service man.

REMOVAL

- (1) Remove the margin release button 1000044.
- (2) Remove segment guide plate 1000412.
- (3) Pull out margin release push rod 1000219.

When the carriage locks, in most cases it can be released by pushing in on the margin release key.

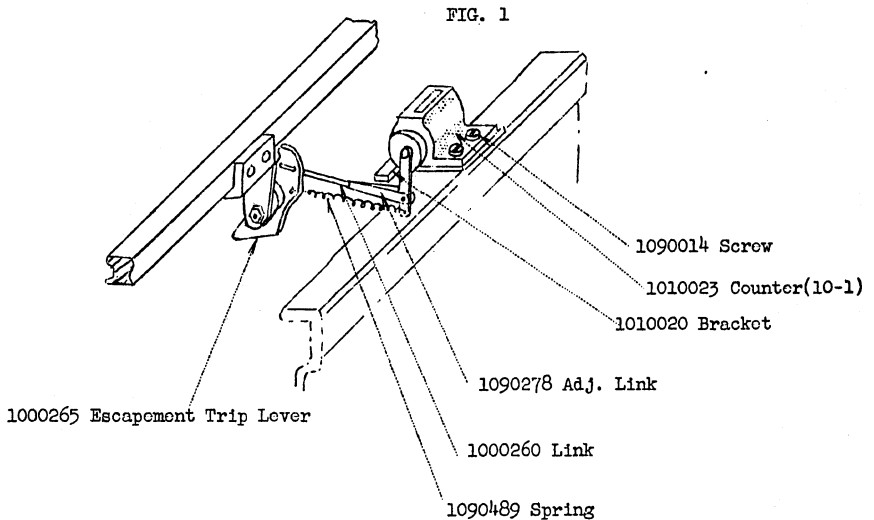


STROKE COUNTER

THE PURPOSE of the stroke counter is to count all type impressions and space bar spaces.

OPERATION Link 1000260 and adjusting link 1090278 serve to connect escapement trip lever 1000265 to counter lever. Spring 1090489 holds link 1000260 against the front end of slot in escapement trip lever 1000265.

When the type bar travels toward the platen it operates through the universal bar, link 1000260, trip lever 1000265 and another link 1000272 and spring 1090489, to pull the counter lever towards the front of the machine. The pull is exerted through the spring and the link acts only as a spacer to keep the two levers the right distance apart.



ADJUSTMENT Be sure that spring 1090489 between counter lever and trip lever holds the link against forward end of slot in trip lever. Lack of sufficient tension on this spring can be the cause of a counter to be inaccurate. Screw adjusting link 1090278 (that is connected to counter lever) in or out on link 1000260 so when the type bar is against the platen the counter lever will strike the stop on the bracket. Adjust the link from this point until the correct setting is obtained.

NOTE: If the counter is fast and the linkage is set correctly, shorten spring 1090489 to correct this condition.

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Check counter with all type bars and space bar striking each several times.

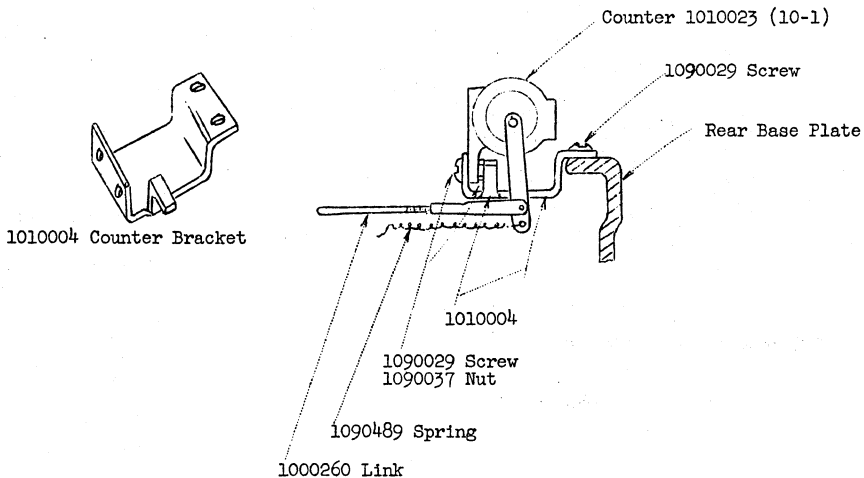
The 10 to 1 counter should be recommended where there is a choice as it is the easiest and quickest to check.

Do not discuss counter settings, ratios, or adjustments with the typists. Lubricate the counter at each end of link 1000260.

STROKE COUNTERS FOR MACHINES EQUIPPED WITH LIFTING PLATEN CARRIAGE

For attaching the stroke counter to machines equipped with the lifting platen carriage the bracket 1010004 shown in Fig. 2 is used. Note that the screws holding the bracket to the rear of the base are different from those shown in Fig. 1 for other types of machines.

The same stroke counter, spring, and link 1000260 are used. The adjustments are made in the same manner as for the standard machine.



REAR COVER PLATES For use with counters the rear cover plate has a section cut out.

A special rear cover plate 1010001 is for use with lifting platen carriage machines with counters.

May 1, 1939

September 16, 1941

EWM CUSTOMER SERVICE DEPARTMENT

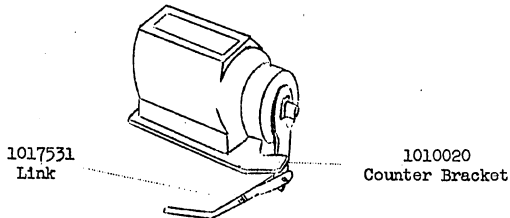
LETTER OF INSTRUCTION #52

TO: ALL EWM SALES AGENTS, IBM SERVICE SUPERVISORS, AND
EWM CUSTOMER SERVICEMEN

SUBJECT: STROKE COUNTERS

Due to the change to short-tooth escapement, two changes have been made in the stroke counter attachment.

A curved link #1017531 supersedes #1000260. The lug on the counter bracket #1010020 has been turned up seventeen degrees. The bracket retains its former part number.



R. F. Sheridan
EWM Customer Service Manager

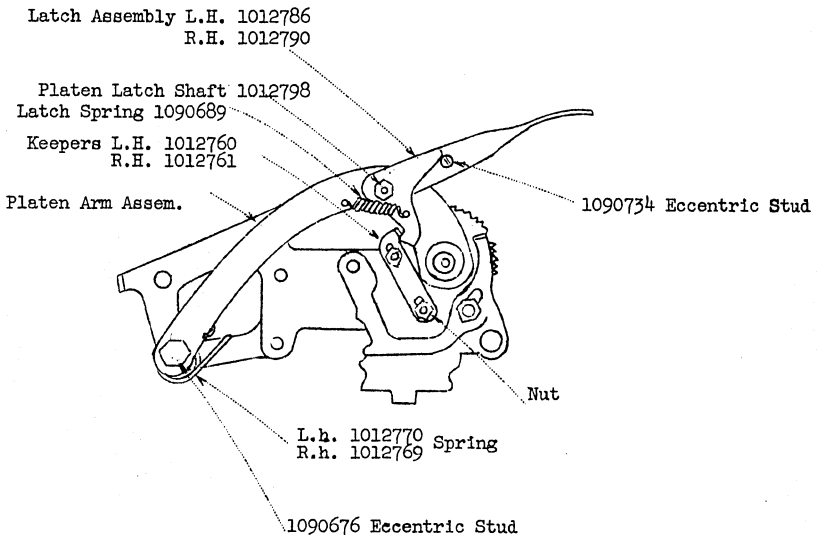
JWLenhart/jfs

LIFTING PLATEN CARRIAGES

PLATENS The lifting platen carriage is equipped with a #6 platen unless otherwise specified. This platen is of the same grade rubber as the #Q-1 platen, but 1/32" undersize. For types of platens available see (Platens).

RING & CYLINDER Unless sample forms are sent with an order, the ring and cylinder on lifting platen machines is adjusted to a five part sample form. When a lifting platen machine is installed the ring and cylinder must be set to the forms that are to be used.

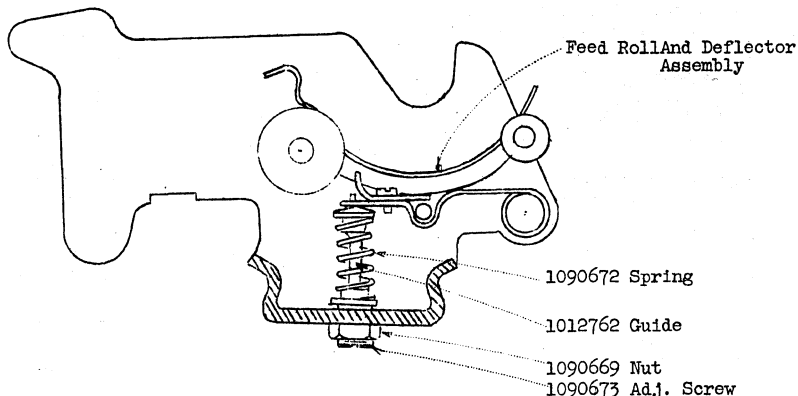
This adjustment is made by the eccentric studs 1090676 which hold the lifting platen to the rear of the carriage frame.



Check the adjustment of the line spacing after changing the ring and cylinder adjustment.

FEED ROLL PRESSURE: The feed roll pressure is applied by the coil spring under the feed roll actuating arm. The pressure can be increased or decreased by adjusting the screw 1090673 under the carriage frame. The screw is adjusted by standing the machine on its back and loosening the lock nut 1090669 with a 3/8" socket wrench.

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If more pressure is required than can be obtained by the above adjustment, remove the screw holding the paper release lever to the feed roll actuating shaft so as to remove the spring. Stretching the spring will increase the feed roll pressure against the platen. Too strong a feed roll pressure will make it difficult to latch the platen.

LATCH KEEPERS The keepers must be adjusted to the thickness of form used. If adjusted too low the platen will latch hard; if adjusted too high there will not be sufficient feed roll pressure allowing the forms to slip. With the forms in place, adjust the keepers so there is a small play between the keepers and the latches when pressing down on the platen (approximately 1/64"). Adjust both sides equally. The keepers are adjusted by loosening the two nuts which hold the keepers to the carriage frame. The elongated slots in the keepers allow for the adjustment.

ECCENTRIC ON PLATEN LIFT LEVER. The eccentric 1090734 on the platen lift lever is adjusted so the latches strike the keepers near the edge of the latches. Proper adjustment of the eccentric causes the platen to latch easier and causes less wear on the keeper.

REGISTER PIN ASSEMBLY AND LEADING EDGE GAUGE

The top cover of the lifting platen machines is drilled so that either the leading edge gauge or the register pin assembly can be fastened to it.

The leading edge gauge is for use with fanfold type of forms. There are two gauges, 1012966 for use with forms up to $8\frac{1}{2}$ " in length and 1013019 for use with forms up to 11" in length.

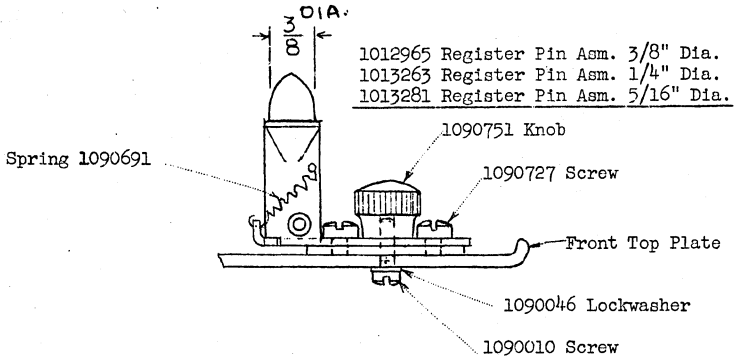
The register pin assembly is for use with open web forms and is adjustable for two widths of perforations, 2- $\frac{3}{4}$ " and 4- $\frac{1}{4}$ " centers. To adjust for the wider spaced holes, move the right pin assembly to the left end of the plate and the left pin assembly to the right end of the plate.

There are three register pin assemblies 1012965 for $\frac{3}{8}$ " holes, 1013281 for $\frac{5}{16}$ " holes and 1013265 for $\frac{1}{4}$ " holes.

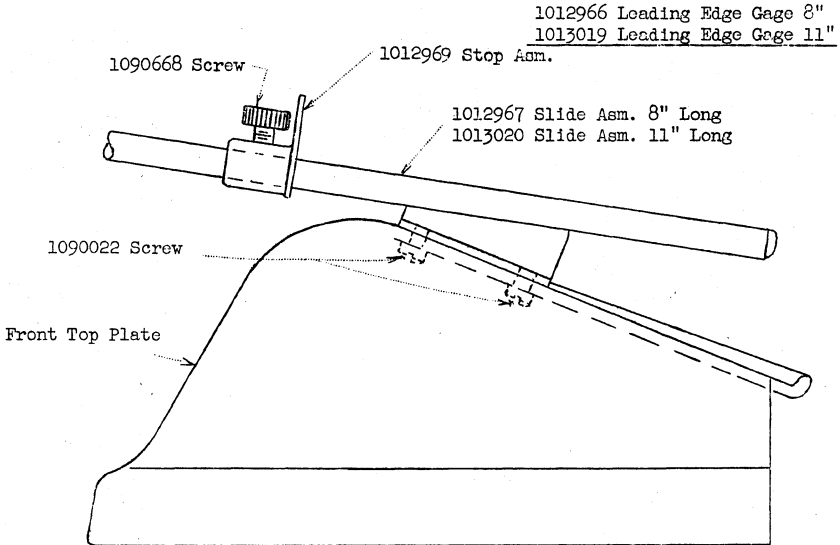
Do not use the leading edge gauge and register pin assembly on the same machine. Patents prevent us from doing this.

May 1, 1939

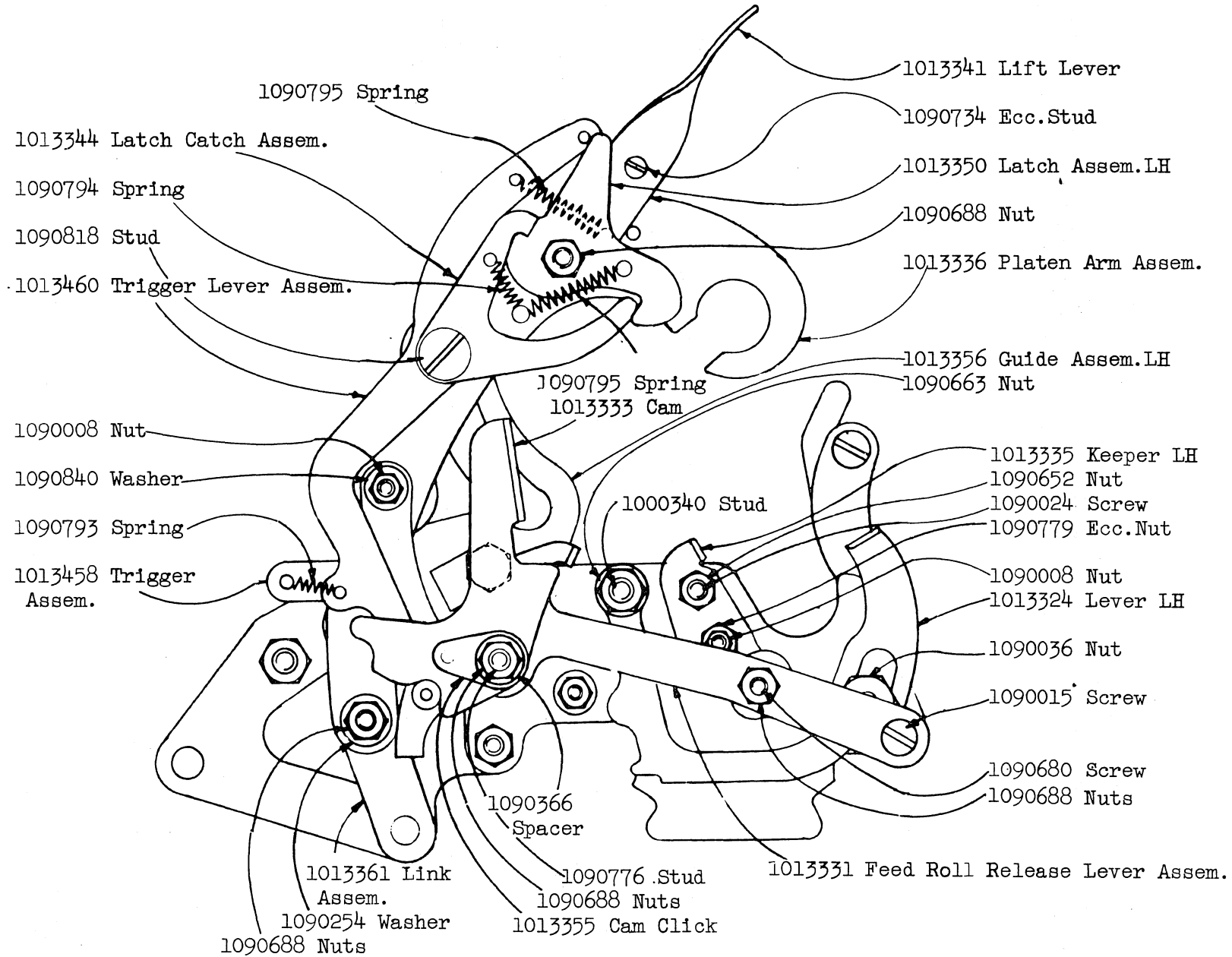
REGISTER PIN ASSEMBLIES



LEADING EDGE GAGE ASSEMBLY

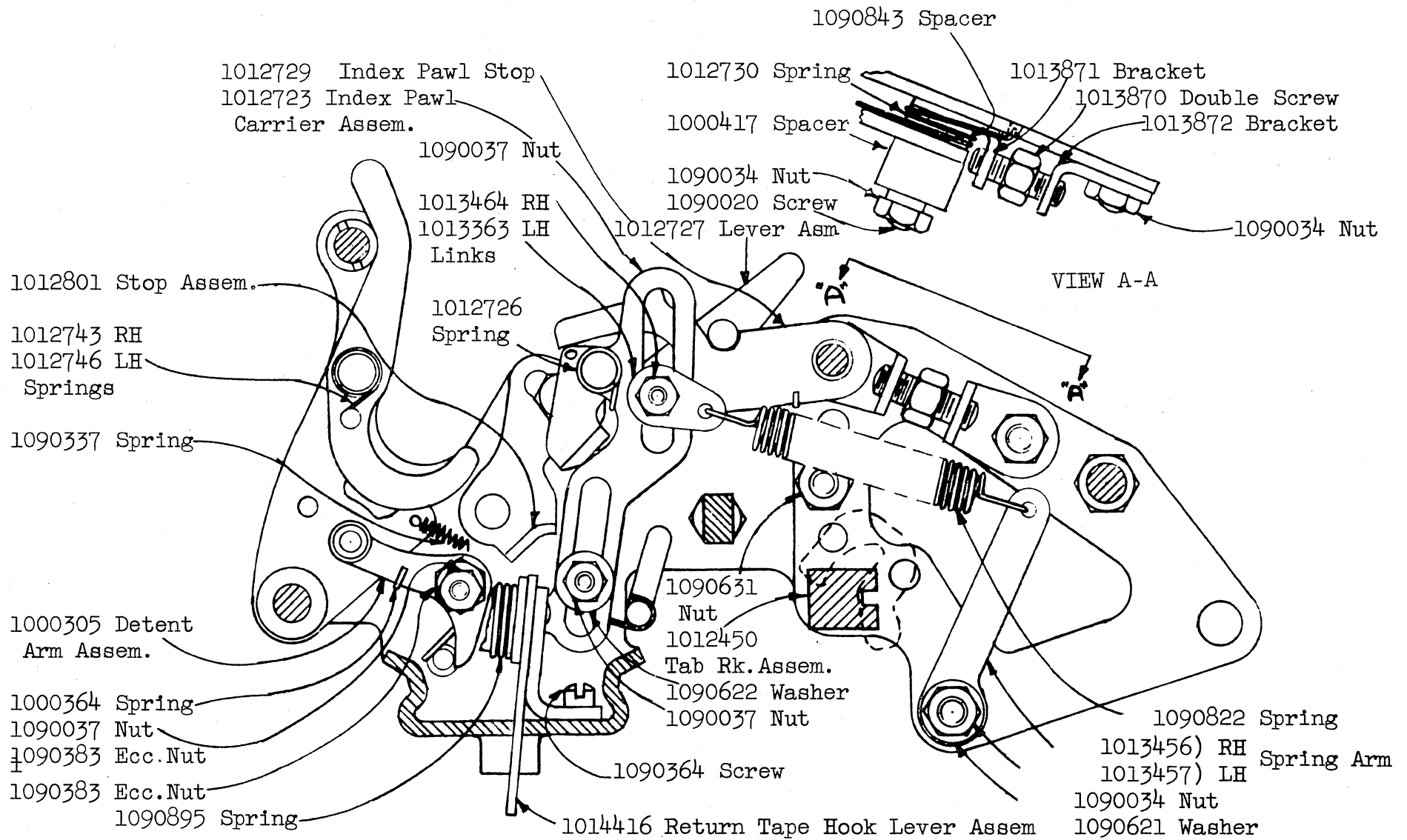


April 1, 1939.



MARCH 1 1939

LEFT SIDE VIEW OF CARRIAGE



MARCH I 1939

LEFT INSIDE VIEW OF CARRIAGE

1012940 Paper Table Assem.

1000426 Paper Table
Lining

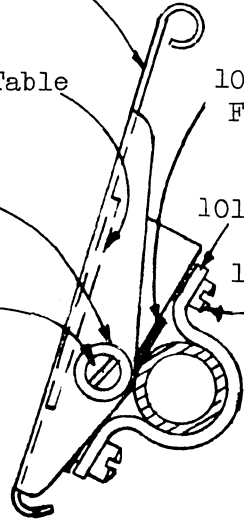
1090394 Washer

1090291 Screw

1012938
Friction Block

1012939 Clamp

1090594 Screw



END VIEW OF PAPER TABLE

1012737 Equalizing
Shaft Retainer

1090524 Screw

1000689 Feed
Roll Assem.

1000694 Equi-Shaft

1090672 Spring

1090669 Nut

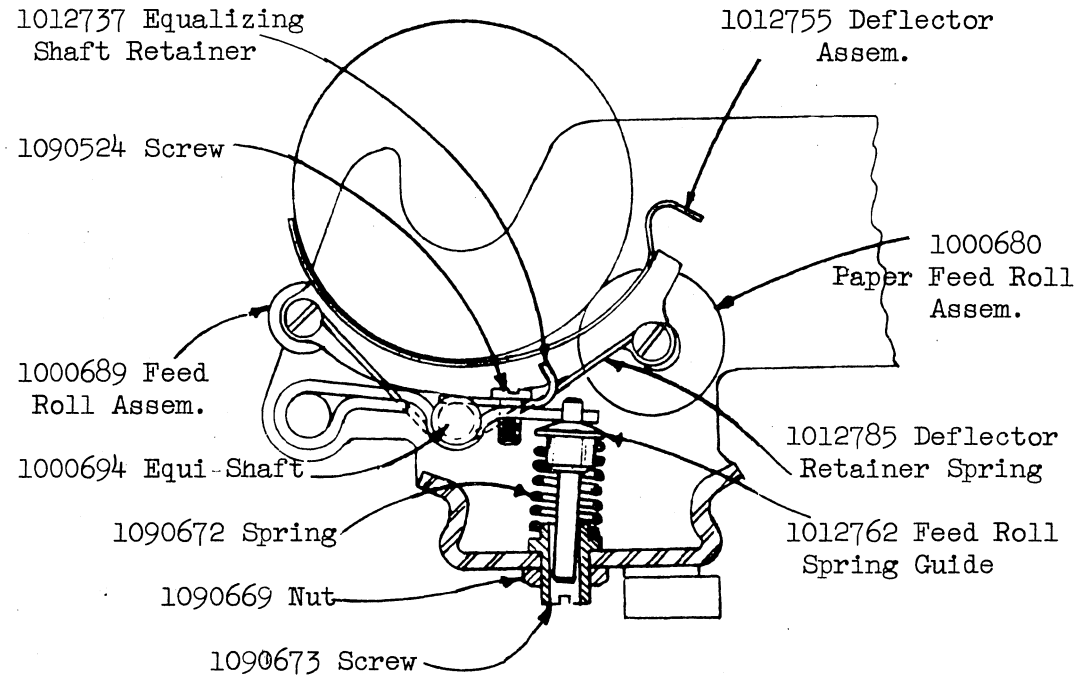
1090673 Screw

1012755 Deflector
Assem.

1000680
Paper Feed Roll
Assem.

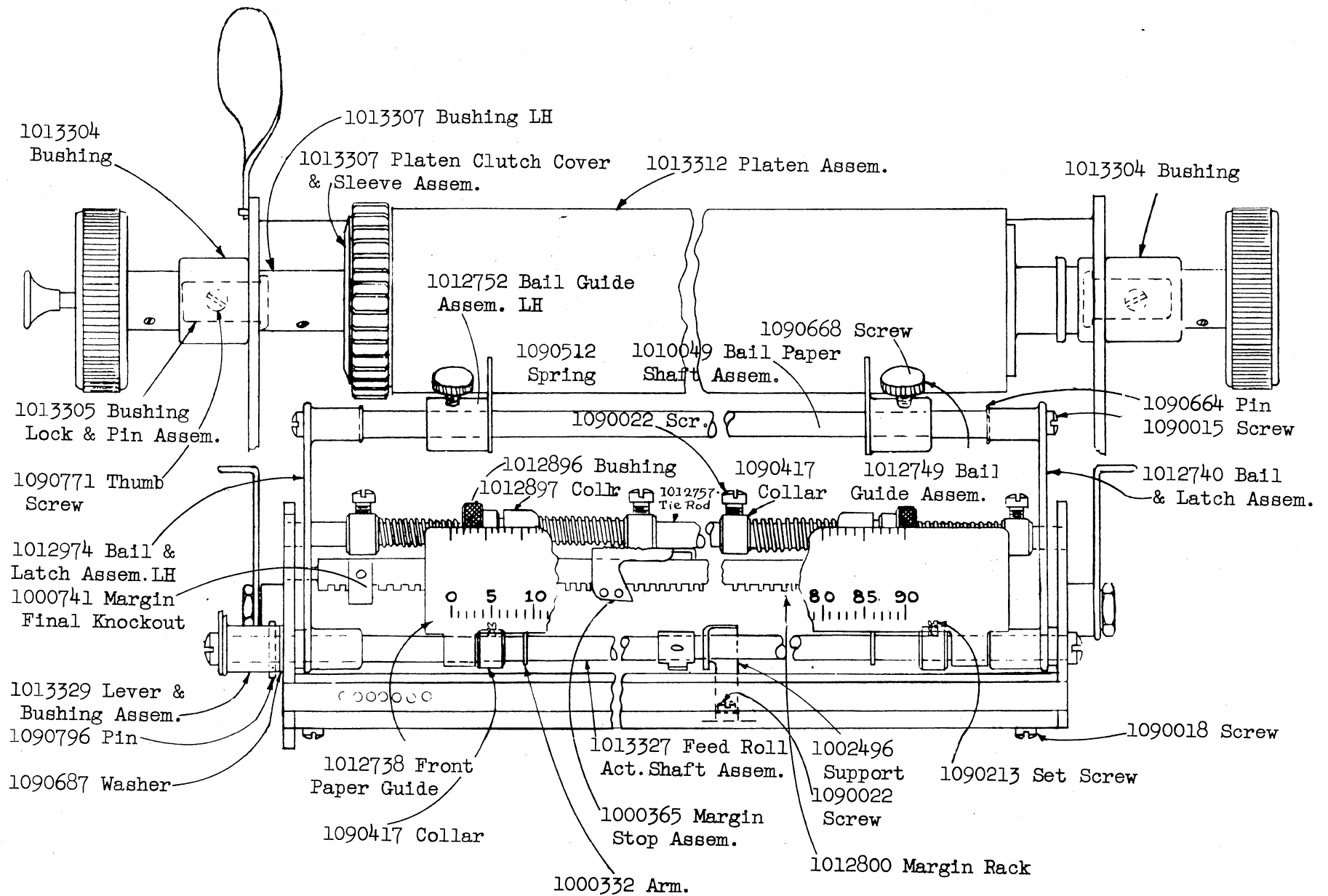
1012785 Deflector
Retainer Spring

1012762 Feed Roll
Spring Guide



VIEW SHOWING FEED ROLL PRESSURE PARTS

MARCH I 1939



MARCH 1 1939

FRONT VIEW OF LIFT PLATEN CARRIAGE

Platens The lifting platen carriage is equipped with a #6 platen unless otherwise specified. This platen is of the same grade rubber as the #1 platen, but 1/32" undersize. For types of platens available see (platens).

Ring and Cylinder Unless sample forms are sent with an order, the ring and cylinder on lifting platen machines is adjusted to .020 thickness of paper or for a five part form

This adjustment is made by the turn buckle 1013870 which is located on each side of carriage frame. Nuts 1090034 have to be loosened before turning turn buckle.

Note: When making ring and cylinder adjustments, always check the index pawl 1012724 for entering the platen ratchet correctly, also when the index pawl bottoms on stop 1012801, the detent arm 1000305 bottoms in the platen ratchet.

Note: This adjustment also effects the paper clearance, which is set to the form used so that it can be shifted around to be straightened.

Feed Roll Pressure. The feed roll pressure is applied by the coil spring 1090672 under the platen lift arm. The pressure can be increased or decreased by adjusting the screw 1090673 under the center of the carriage frame. The screw is adjusted by standing the machine on its back and loosening the lock nut 1090669 with a 3/8" socket wrench.

If more pressure is required than can be obtained by the above adjustment, remove the screw holding the paper release lever to the feed roll actuating shaft so as to remove the spring. Stretching the spring will increase the feed roll pressure against the platen. Too strong a feed roll pressure will make it difficult to latch the platen.

Latch Keepers (Left #1013335 and Right 1013334). The keepers must be adjusted to the thickness of the form used. If adjusted too low the platen will latch hard. If adjusted too high there will not be sufficient feed roll pressure allowing the forms to slip. With the forms in place adjust the keepers so there is a small play between the keepers and the latches when pressing down on the platen. (approximately 1/64"). Adjust both sides equally. The keepers are adjusted by loosening the two nuts which hold the keepers to the carriage frame and turning the eccentric screw 1090779 to raise or lower, according to the forms used.

Eccentric on Latch Catch Assembly The eccentric works in conjunction with the latch and the trigger arm on the feed roll release. The latch catch assembly 1013350 is adjusted by the eccentric 1090818 so the latch will just touch the keeper, 1013335 when the platen comes down into position. Proper adjustments on the eccentric saves wear on the latches and the keepers.

Paper Clearance This adjustment is made by loosening nut 1090688 and moving arm 1013329 either up or down. Set the clearance at a minimum for the thickness of form used, to prevent carbon marking as the feed rolls release into position. After making the adjustments, check feed roll pressure.

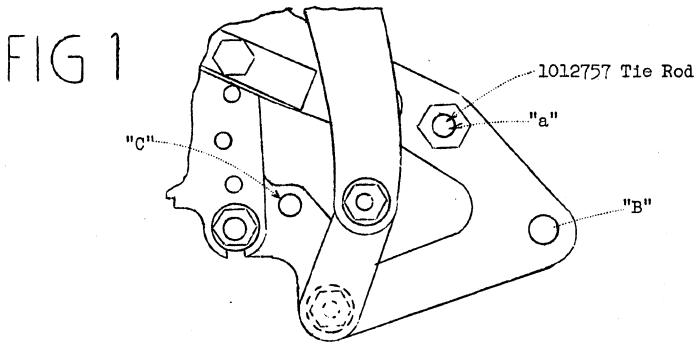
Eccentric on Platen Lift Lever The eccentric 1090734 Controls the distance the latch 1013350 travels behind each keeper. It is adjusted so that the latch will engage the keeper about half way back on the hook, after the paper feed mechanism has gripped the paper.

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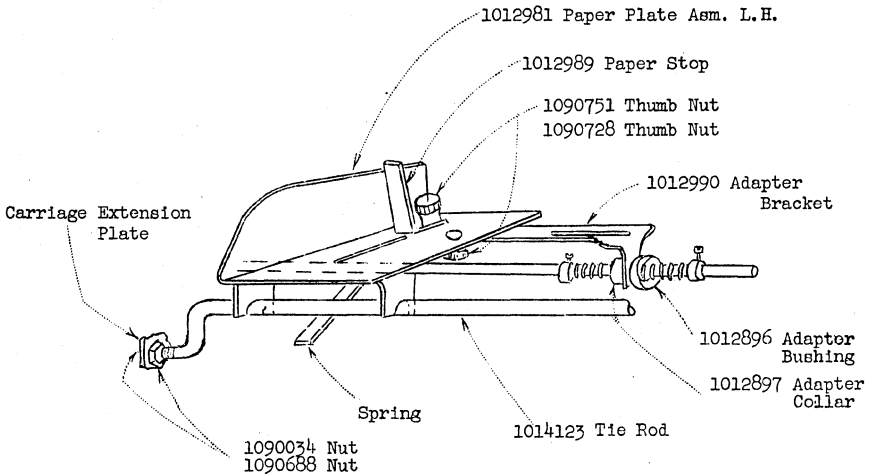
FRONT FEED POSITIONING PLATE

INSTRUCTIONS FOR INSTALLATION

- (1) On Lifting Platen machine, change location of tie rod 1012757 from point "a" to point "B", on Fig. 1.

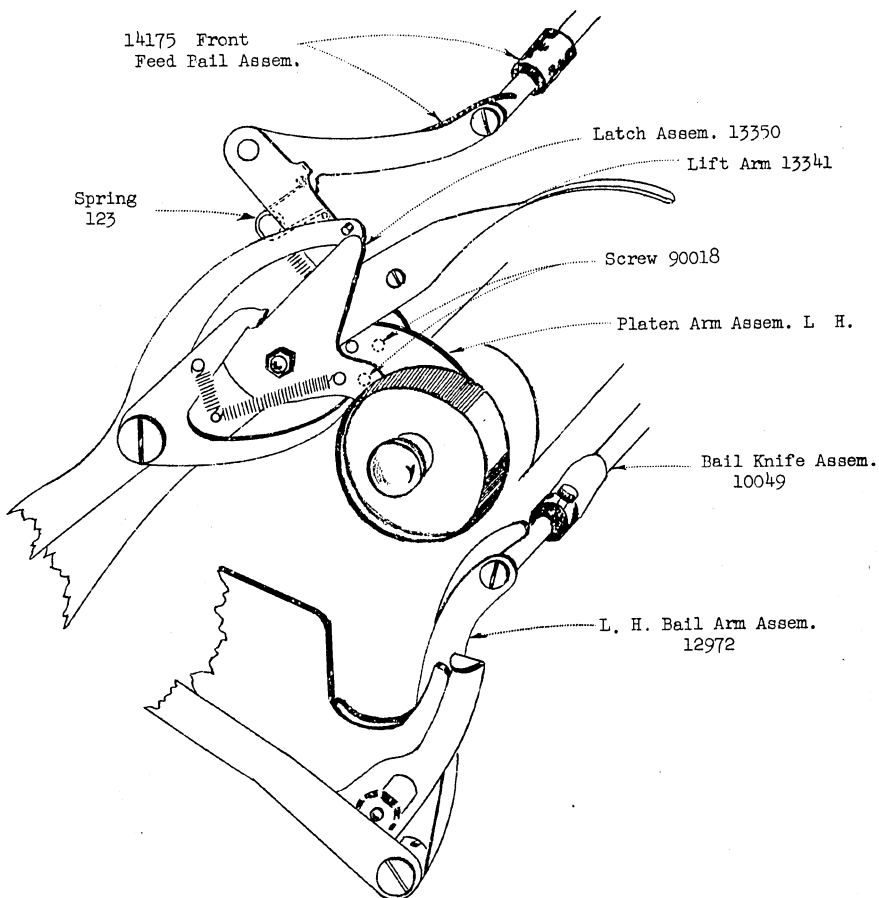


- (2) Remove 1014123 tie rod from positioning plate, Fig. 2, and place in hole in extension plate at point "C" on Fig. 1. Do not lock in place yet.
- (3) Adjust the adapter collars and bushings for the correct spacing to fit the adapter bracket, 1012990.
- (4) Place the positioning plate on the tie rod, 1012757, and then on the 1014123 tie rod. Be sure the flat spring is under the tie rod as shown in Fig. 2.
- (5) Tighten nuts to lock 1014123 tie rod.



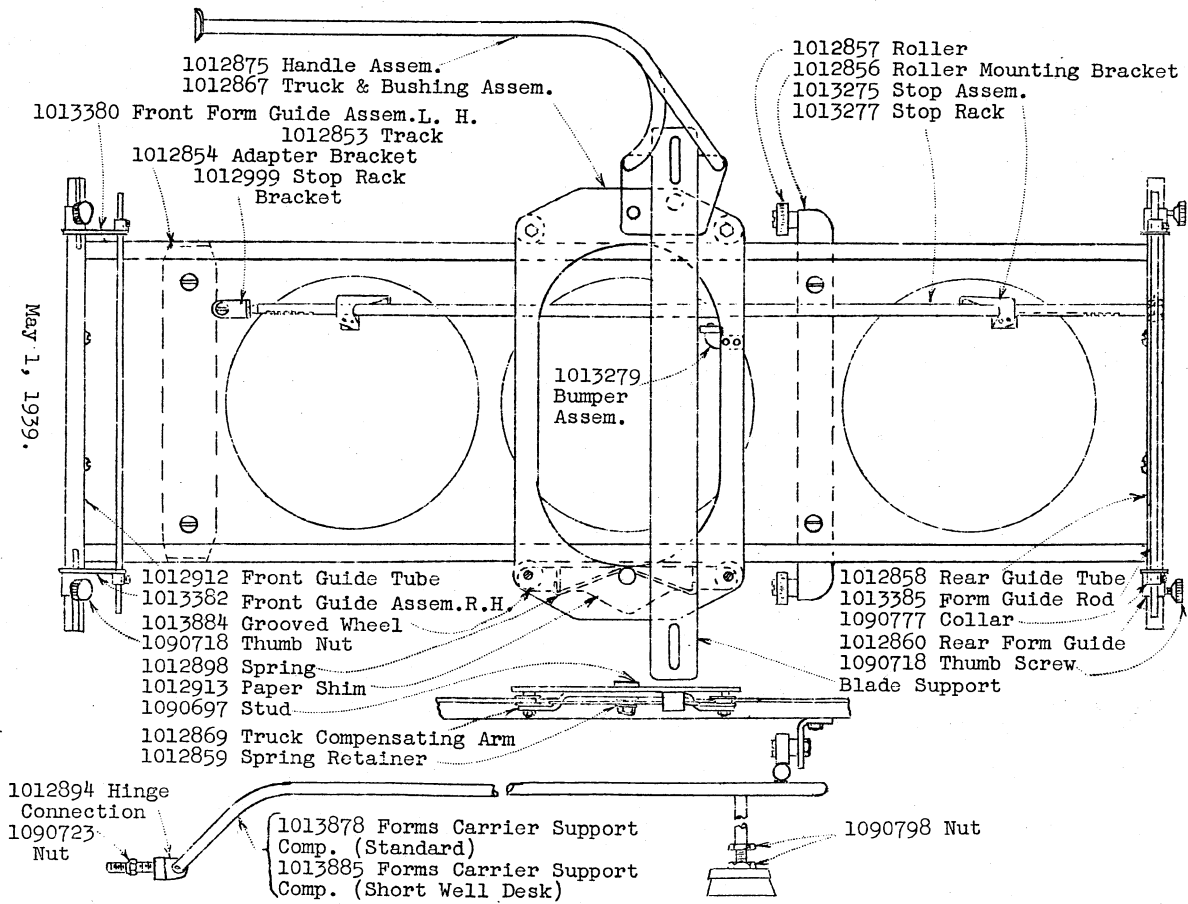
May 1, 1939

Instructions for assembling Front Feed Bail Assembly to
Lifting Platen Machines.



Remove #10049 Paper Bail Shaft and Knife Assembly, #12740 Right Bail Arm and Latch Assembly, and #12974 Left Bail Arm and Latch Assembly. Replace the 2 #90337 Carriage Release Universal Bar Springs with 2 #90881 Carriage Release Universal Bar Springs. (Hook springs in holes in Carriage Frame End Plates)

Assemble #14061 Front Feed Bail Assembly on the Platen Arms (see sketch) using 4 #90018 Screws and 2 #90731 Lockwashers. Assemble 2 #123 Springs on #14061 Front Feed Bail Assembly.



FORMS CARRIER ATTACHMENT

1. The Forms Carrier Attaching Bar should be fastened in the upper bracket holes.
2. The locating collars should be set so that the groove in the knurled collars line up with the outside edge of the rear feed roller.
3. The knurled collars should be on the outside collars.
4. The pressure springs should be compressed to about $7/8$ of an inch.
5. Remove the two upper base screws and install the hinge screws. The points should be to the outside of the machine.
6. Install carrier support, adjusting foot screws to level support.
7. Assemble handle to underside of carrier truck.
8. Attach off-set guides to the machine end with thumb screw out. Straight guides to the rear of the carrier.
9. Attach carrier to the attaching rod.
10. Install the blade support on the Forms Carrier truck.
11. Adjust the carrier support to ride centrally on carrier support rail.
 - (a) Turn the hinge screws in or out to bring support rail parallel to machine.
 - (b) Turn the foot screws up or down to level support.
 - (c) The roller bracket screw hole is elongated for further adjustment to center rolls on bar.
 - (d) Forms Carrier must be at right angles to the adapting bracket.
12. Thread the forms between the rear and front guides beneath the guide shaft, having the forms circle the platen inside of the tear-off bar and guides.

Set the forms to be in the center of the platen.

13. For fanfold forms, lay a carbon blade on each post, across the top of the forms. Adjust all paper guides so the forms will lie centrally in the machine. The end of the carbon blades should lack approximately $3/16$ of an inch from reaching the folded edge of the forms.

The guides are adjusted to touch the edge of the paper, but not buckle it.

Run the carbon carrier truck back and forth to check the front and rear guides for being straight. Readjust all guides until the forms lie perfectly straight.

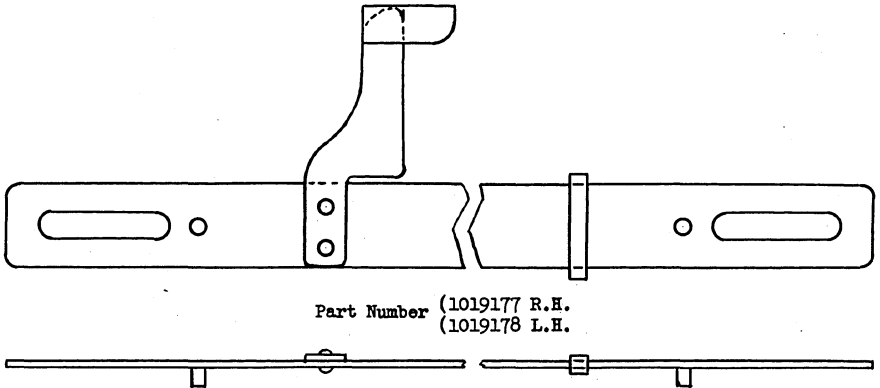
January 28, 1943

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #79

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: NEW STYLE SLITTER BLADES FOR MANUAL SHIFTING FORMS CARRIER
MACHINE

Misunderstandings have arisen in the field concerning the form-width-capacity of the new slitter blade.

When using the 12" blade support #1012948 with slitter blades, the maximum width form accommodated is 7-7/8". Therefore, if it is necessary to slit the standard 8-1/2" form, we issue a 14" blade support #1012949 which has the maximum capacity of 9-7/8" when using slitter blades and is designed to be used on the 12" forms carrier.



Part Number (1019177 R.H.)
(1019178 L.H.)

SLITTER BLADE

The 16" blade support #1013104 will slit forms up to 11-7/8", which is the widest form that the present style of slitter blade will accommodate.

HOWickman:mfh

R. F. Sheridan
EWM Manager, Customer Engineering

14. Check the above by latching platen down and turning two or three bills through the machine.
15. Fold the carbon paper squarely over the blade and use clips to prevent it from moving.

If using carbon paper without the sewed strip, use a piece of bond paper over the carbon to prevent carbon from tearing.

16. The black blade support post goes on the left side of the truck and the black tipped blades with the lugs which are used as spacers and guides, go in the down position. The carbon side of the paper should always be up.
17. Slitter blades should fit very close to the perforated sides to prevent the wire from pulling the forms sideways.

The slitter wires should be approximately $3/32$ of an inch inside the fold in the form, then the curved end of the wire will project out the correct distance.

18. Open web forms, use a single blade which will be supported on each end.

Use the same procedure as for fanfold forms to align paper straight into the machine.

OPERATING INSTRUCTIONS

19. Set the left hand margin stop at the outer margin and set tabular stop at the outer margin and set tabular stop for all the columns.

After the last item is written, return the carriage and the form should be central on the leading edge gage which is attached to the top cover.

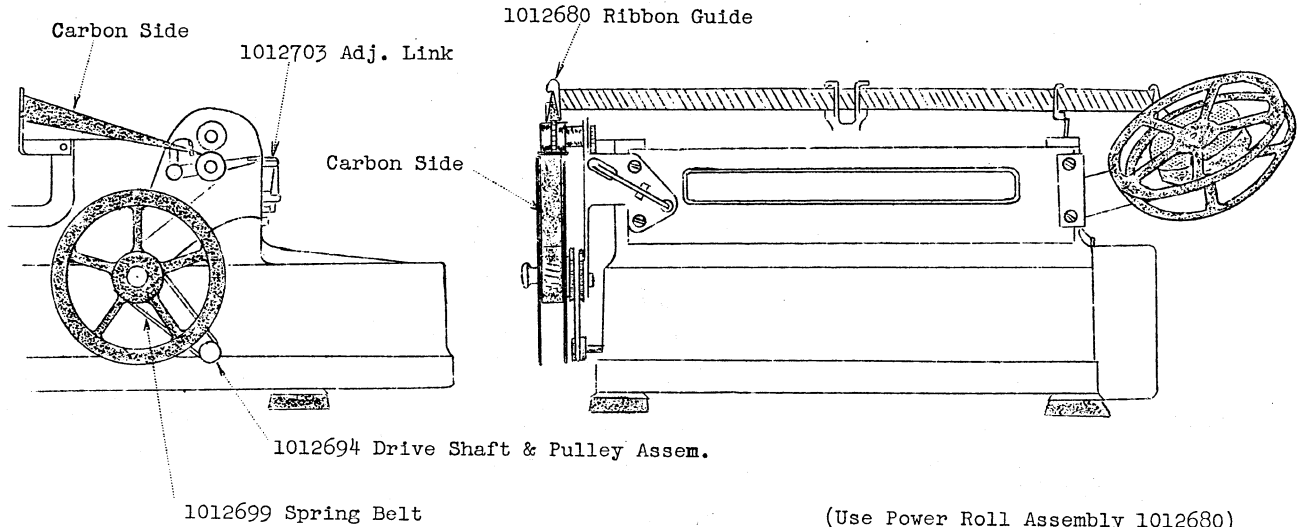
20. Use the left hand to unlatch the platen. If using open web, it is advisable to hold forms before raising platen to prevent sheets from slipping.
21. With right hand catch the edge of the forms and pull them against the vertical stop on the leading edge gage. Hold forms firmly and push the carbon carrier back into the next position.

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22. It is advisable to set rear carrier stop at a point that will allow the carbons to be shifted about $3/4$ of an inch past the perforated edge.
23. While holding the forms firmly against the vertical stop, latch the platen into position. The written bill can be torn off and the new bill in the first writing line position.

If the work is heavy, it is advisable to adjust gage to bring the forms to the perforated edge for tearing off.

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CARBON PAPER RIBBON ATTACHMENT 1012650

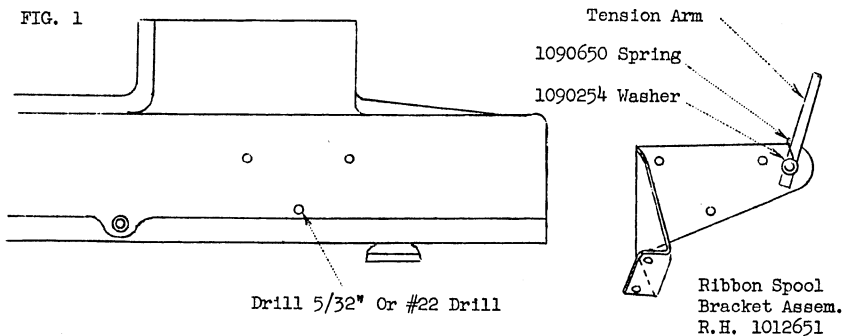
CARBON PAPER RIBBON ATTACHMENT 1012650

The carbon paper ribbon feeds from the right hand spool to the left hand spool and the direction of feed cannot be reversed. After the ribbon is wound on the left spool the spools are interchanged. The ribbon is thus used on both the top and the bottom.

The ribbon is fed by a mechanism operating from the left ribbon feed lever, and is wound on the left spool by the action of the spring belt operating from a pulley attached to the power roll.

INSTALLATION

- (1) The right hand ribbon spool bracket 1012651 is a template for locating shaft extension hole in left side of base. Use two each of 1090052 collars, 1090005 screws and 1090034 nuts (one nut on inside of base and one outside) to hold template in position. Drill through base with #22 drill. Be careful to drill through straight to prevent striking power roll shaft locating boss. Snap power roll in place and through hole just drilled, insert pulley and shaft assembly and screw same into power roll.



- (2) Remove front plate and drill $9/32''$ hole located as shown in Fig. 2. This is a clearance hole and can be filed to clear part if necessary.

Re-assemble front plate to machine and add right hand bracket on top of plate, holding in place with two front plate screws. Place left hand bracket in position and before tightening, be sure drive pin is in position in slot and against ribbon feed pawl lever.

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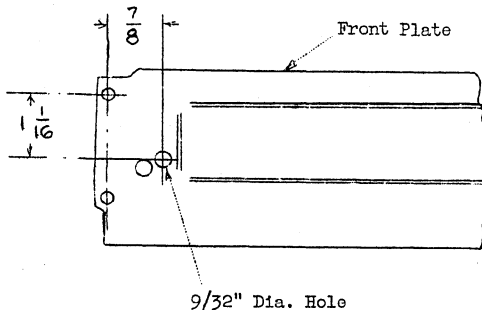


Fig. 2

- (3) Remove cloth ribbon.
- (4) Remove top screw that holds left corner ribbon guide. Place carbon paper ribbon guide 1012680, on outside of base and hold same in place with screw just removed. Head of screw is now on outside of base. One screw now holds each corner guide in place which is sufficient. Paper ribbon guide may have to be adjusted slightly by bending to guide ribbon between feed rolls properly.
- (5) Feed ribbon through guides as shown on drawing, attach end to spool hub, place on shaft and clamp with thumb screw.
- (6) To change spools from left to right hand position, remove thumb screw and place spool flange and hub assembly upon which paper is wound to right hand side of machine and proceed as in No. 5.

ADJUSTMENTS Adjust link 1012703 so that hand operation of type bar will feed ratchet far enough forward for the check pawl to drop into the tooth. Then set the feed pawl eccentric stop to prevent overthrow. The feed wheel should lock when the type bar is in the basket.

There is a slight variation in the base castings and when feeding attachment is crewed securely in place there should be very little play between the bent drive pin and the ribbon feed lever of the Writing Machine. If there is too much or too little clearance at this point, bend the end of the drive pin slightly one way or the other to provide proper clearance. Be sure that the drive pin does not bind even the slightest amount in the bushing.

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Remove ribbon lift bar spring from bottom of the Writing Machine for uniform impression. This spring can be left unhooked so long as the attachment is left in place, even though it is not being used.

If the carbon paper ribbon feed attachment is removed from the machine, re-hook this spring.

To prevent carbon paper ribbon breakage:

- (1) The characters must not strike too near the edge of the ribbon. Adjust the ribbon throw.
- (2) The spring belt must not pull too hard. Stretch the spring to regulate the tension.
- (3) The impression indicator must be set so the type bars will strike lightly so as not to cut the ribbon.
- (4) The ribbon must feed through the tension arm on the right spool bracket as shown in the drawing to prevent tearing.

Carbon Paper Ribbon

300 feet long -	17/32" wide
#18	- Heavily Carboned
#187	- Medium Carboned

If a carbon ribbon attachment is to be installed on a machine of 10,000 or 20,000 serial number, specify the serial number when ordering the attachment so the correct power roll will be supplied.

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INSTRUCTIONS FOR ALIGNING TYPE

THE PURPOSE of aligning type is to adjust the characters so they will print evenly and in alignment with each other at the printing point.

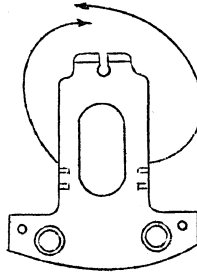
TYPE GUIDE Many times service men try to align machines when all the aligning trouble lies in the type guide. It has become worn or the throat has opened up until it no longer "guides" the type bar to the paper. We have redesigned the type guide used below 20,000 series because the guides wore too rapidly. Therefore many of the older machines now in use will require the type guide replaced, especially where close alignment is required.

BEFORE REMOVING THE OLD GUIDE, select a type bar which enters the guide exactly in the center of the throat. Replace the old guide with the new one. Try the same type bar for entering the new guide as it did the old one. Do not adjust the type bar to the new guide, but the guide to the type bar. The guide must be peened to the left or to the right to adjust as required. Do not attempt to knock the guide over with a hammer because the center of the segment is not strong enough to permit this.

ADJUSTMENT OF GUIDE Remove the guide, place it on a solid block and peen the back edge by using a round nose chisel or peening hammer. It may be necessary to do this several times, but the guide bar must enter exactly in the center of the guide or the alignment of all bars will be affected.

To move the Type guide Opening To the right
peen the left side of the guide.

To move the type guide opening to the left
peen the right side of the guide.



The throat of the guide should be polished just enough to allow the type bars to pass through freely. Fold a piece of emery cloth over a heavy card to do this.

TO TEST Strike up the keyboard against the "N" to test the location of the new type guide. Start with the number 1 key (Q), 2 key (A), 3 key (2), 4 key (Z), etc. on through the forty-two keys, using the "N" between each one.

If the type on the left side of the keyboard print high and the right side low, the type guide lies too far to the left.

If the type on the left side of the keyboard print low and the right side high, the type guide lies too far to the right.

ALIGNMENT The type bars are aligned in relation to each other by using the "N" as a guide. The small "n" for the lower case characters and the large "N" for the upper case characters. The "N" is used as a guide because it is a vertical character in design and is located in the center of the type basket. It is advisable to check the "N" before aligning other characters to it - making sure it is straight and enters the type guide without striking it on either side.

IT IS VITALLY IMPORTANT THAT THE CAM UNITS ARE PROPERLY SET IN RELATION TO THE POWER ROLL BEFORE ATTEMPTING TO ALIGN TYPE. (See "Cam Units")

There are two other adjustments to carefully check BEFORE and AFTER an aligning tool is used:

- (1) That the type bar is on ring and cylinder.
- (2) That the type bar enters the type guide in the center of the slot and does not ride the guide on either side.

There is not set procedure to follow for aligning type. Each type bar may need a slightly different adjustment to position the character so it will be in line with the others at the printing point. However, unless one has had a great deal of experience, it is best to follow the procedure that governs the alignment of a single type bar after it has been installed in the machine.

The procedure is as follows:

- (1) Adjust type bar for ring and cylinder
- (2) Center type bar in type guide.
- (3) Twist type on feet or so it strikes evenly on both sides.
- (4) Center the lower case letters between two small "n's".
- (5) Center the upper case letters between two capital "n's".
- (6) Raise or lower type.
- (7) Cut type (only when necessary).

(1) TO ADJUST TYPE BAR FOR RING AND CYLINDER. The platen is called a cylinder. The flat machined surface on the segment is an anvil or ring. The purpose of the ring is to prevent over-printing. The type bar must be adjusted so it strikes the ring on the segment the same time it touches the cylinder. If the bar strikes the cylinder and does not touch the ring the character will print darker than the others, appear blurred or emboss the paper. If the type bar strikes the ring harder than it should, it will cause the type character to print lightly.

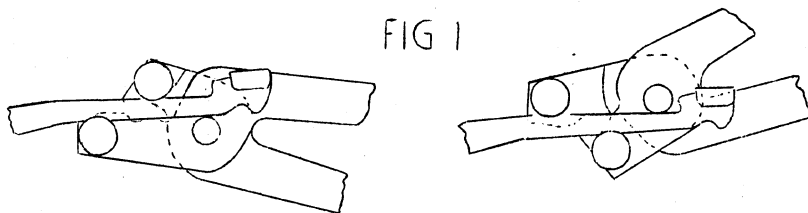
Therefore, it is necessary to have the platen parallel in relation to the type, i.e., so the type strike with the same impression on both ends - not light on one and heavy on the other. The period and comma are good characters to use in checking the platen for being parallel.

The platen, when it is in the machine, rests on two yokes 1000397 and 1000371 which are adjustable, either forward or backward, by eccentric screws 1000339 (see "Platen Adjustment")

Insert a sheet of paper in the machine and tear off a piece of the corner about one-half inch wide and two and one-half inches long. Hold the type bar against the platen firmly but not tightly with the thumb. Place a strip of paper between the cylinder (platen) and the type, pulling it out slowly so as to get the feel of friction at that point. Place the paper between the type bar and the flat surface on the segment at the point where the type bar strikes the segment. Pull it out slowly to get the feel of friction at that point. The type bar should touch the segment with a little more pressure than it does the platen. Try several of the bars so as to get the feel of the ring and cylinder adjustment of that particular machine.

IF THE TYPE BAR STRIKES HEAVIER ON THE CYLINDER than it does on the ring, bend the type bar with tool 6-S backward enough to allow the ring to take its portion of the type blow. In severe cases it may be necessary to use the mauler tool andpeen out the stock on the type bar at the point where it touches the segment. Be sure after making this adjustment that the type bar is centered in the type guide.

FIG 1

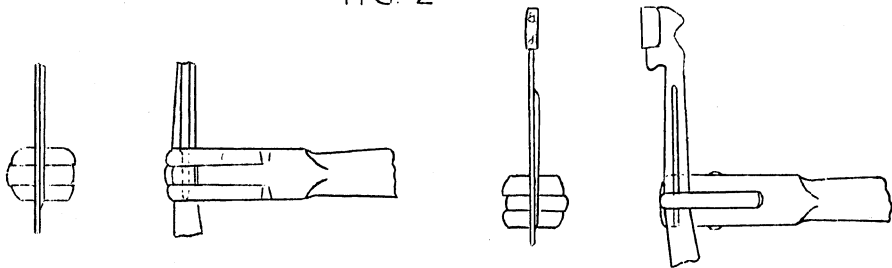


IF THE TYPE BAR STRIKES THE RING TOO HARD, it is necessary to bar bend the type bar with tool 6-S forward enough to allow it to strike the platen almost as hard as it does the ring. In severe cases it may be necessary to file the type bar at the point where it strikes the ring. Be sure after making this adjustment that the type bar is centered in the type guide.

IN NEARLY ALL CASES WHERE THE TYPE CUTS OUT THE CHARACTERS ON STENCILS, IT IS BECAUSE THE TYPE BAR IS STRIKING TOO HARD ON THE CYLINDER.

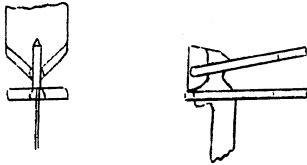
- (2) TO CENTER TYPE BAR IN TYPE GUIDE. Push the type bar slowly into the type guide by placing the end of a finger tip in back of and near the bottom of the type bar. Watch how the bar enters the type guide. Bend the type bar either to the right or to the left with three-prong pliers or by holding the bar firmly near the segment with a pair of pliers and with a twister adjust the upper part of the type bar enough so it will go into the type guide centrally when it is being pushed into it slowly by the end of a finger tip.

FIG. 2



- (3) TO TWIST TYPE ON FEET OR TO ADJUST TYPE SO IT WILL STRIKE THE PAPER EVENLY ON BOTH SIDES OF THE CHARACTER. Use the type wrenches 1002428. Catch the type bar just below the type in the narrow slotted end of one of the wrenches and with the wide slotted end on the other wrench twist the type either to the right or to the left - holding the type bar firmly with the lower wrench so as to only twist the type bar where the type is soldered on to it.

FIG. 3

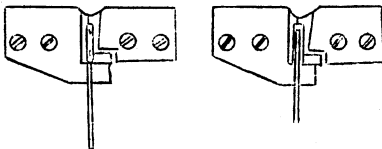


- (4) TO CENTER THE SMALL TYPE CHARACTERS BETWEEN TWO SMALL "n's". With the machine writing small letters strike the one to be centered with the "n" (nananana).

Use the side aligning tool (knockover T-3951 or T-2401). Place the type bar in the end of the tool and move the character as much as needed.

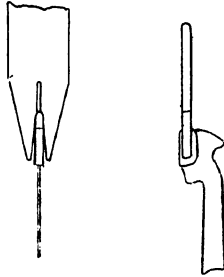
CARE MUST BE EXERCISED WHEN PLACING THE SIDE ALIGNING TOOL ON THE BAR. MAKE SURE THE TYPE BAR IS IN POSITION AND THE JAWS OF THE SIDE ALIGNING TOOL MOVE THE TYPE THE DIRECTION INTENDED.

FIG. 4



- (5) TO CENTER UPPER CASE CHARACTERS BETWEEN TWO CAPITAL "N's". With the machine writing the capital letters strike the one to be centered with the capital "n" (NANANANANA). Use type wrench 1002428. Hold the type bar against the platen with the thumb and center the character by pulling the type either to the right or to the left, as the case may be.

FIG. 5



(6) TO RAISE OR LOWER TYPE

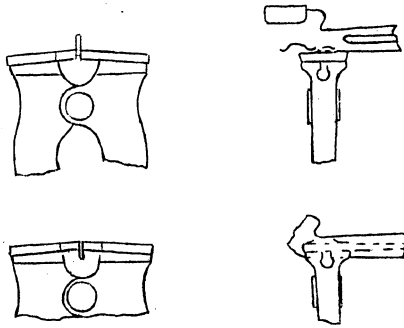
- (a) To raise - Fig. 6A. To raise the type to the line of writing use maulers or the tool with rounded jaws and peen the bar in the throat on the inside as much as needed - try a little at a time and peen in the same place again if possible - or if necessary.

This stretches the stock on the inside of the bar and may leave the upper half of the capital letter printing lightly. If it is necessary to correct this, use the type cutters - the tool with the sharp jaws - and cut the type as shown in #7. Be careful not to cut the type too close to the type face.

- (b) To lower - Fig. 6B. To lower type to line of writing use maulers or the tool with rounded jaws and peen the bar in the throat on the outside as much as needed. Try a little at a time and peen in the same place again if possible - or if necessary.

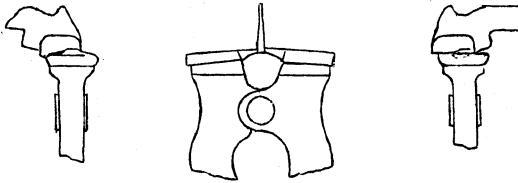
This stretches the stock on the outside of the bar and may leave the small character printing lightly. If it is necessary to correct this, use the type cutters - the tool with the sharp jaws - and cut the type as shown in #7. Be careful not to cut the type too close to the type face.

FIG. 6 B



- (7) TO CUT TYPE. Cut type only when absolutely necessary. It is explained in #6 - To raise and lower type.

FIG. 7



NOTE: There are certain characters that appear out of alignment when used in unusual combinations. Before attempting to make any correction, strike each letter between two "n's". Thus ascertaining which character, if any, needs aligning.

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"OVERPRINTING" AND UNDERPRINTING Overprinting is caused by the upper case characters striking the paper when writing in the lower case. This causes a mark to appear over the small case characters. Underprinting is caused by the lower case characters striking the paper when writing in the upper case, causing a mark to appear under the capital letters.

The following instructions will help to eliminate this condition:

- (1) Check the platen adjustment, making sure the type strike the anvil on the segment at the same time they do the platen. See ring and cylinder adjustment.
- (2) Adjust the basket so the type print evenly on the top and bottom of the characters. If "overprinting" still results, adjust the basket to cause the characters to print heavier on the bottom than on the top. If correcting for "underprinting", adjust the type to print heavier on the top. (See Shift)
- (3) Check the motion of the basket shift. (See Shift)
- (4) If "overprinting" occurs when typing a multi-copy form, it can be reduced or eliminated by the use of an undersize platen.
- (5) Form the card holder to keep the paper against the platen as closely as possible without causing the carbon paper to mark the copy sheet.

UNDERPRINTING Underprinting may be caused by a burr or piece of solder on the lower edge of the type face.

HEAVY IMPRESSION If a character prints with too heavy an impression, it can be corrected by using the 6-S bar bender to adjust the bar to strike with more force on the anvil of the segment than on the platen.

If the impression cannot be reduced sufficiently by the above, it can be corrected by replacing the type bar spring 1090341 with a heavier spring 1090161. The character may then strike too light. This is corrected by stretching a few coils of the spring. Do not stretch the entire spring as it may then be too weak.

LIGHT IMPRESSION If a character prints with too light an impression, bend the bar to strike harder on the platen than on the anvil of the segment. Use the 6-S bar bender as above.

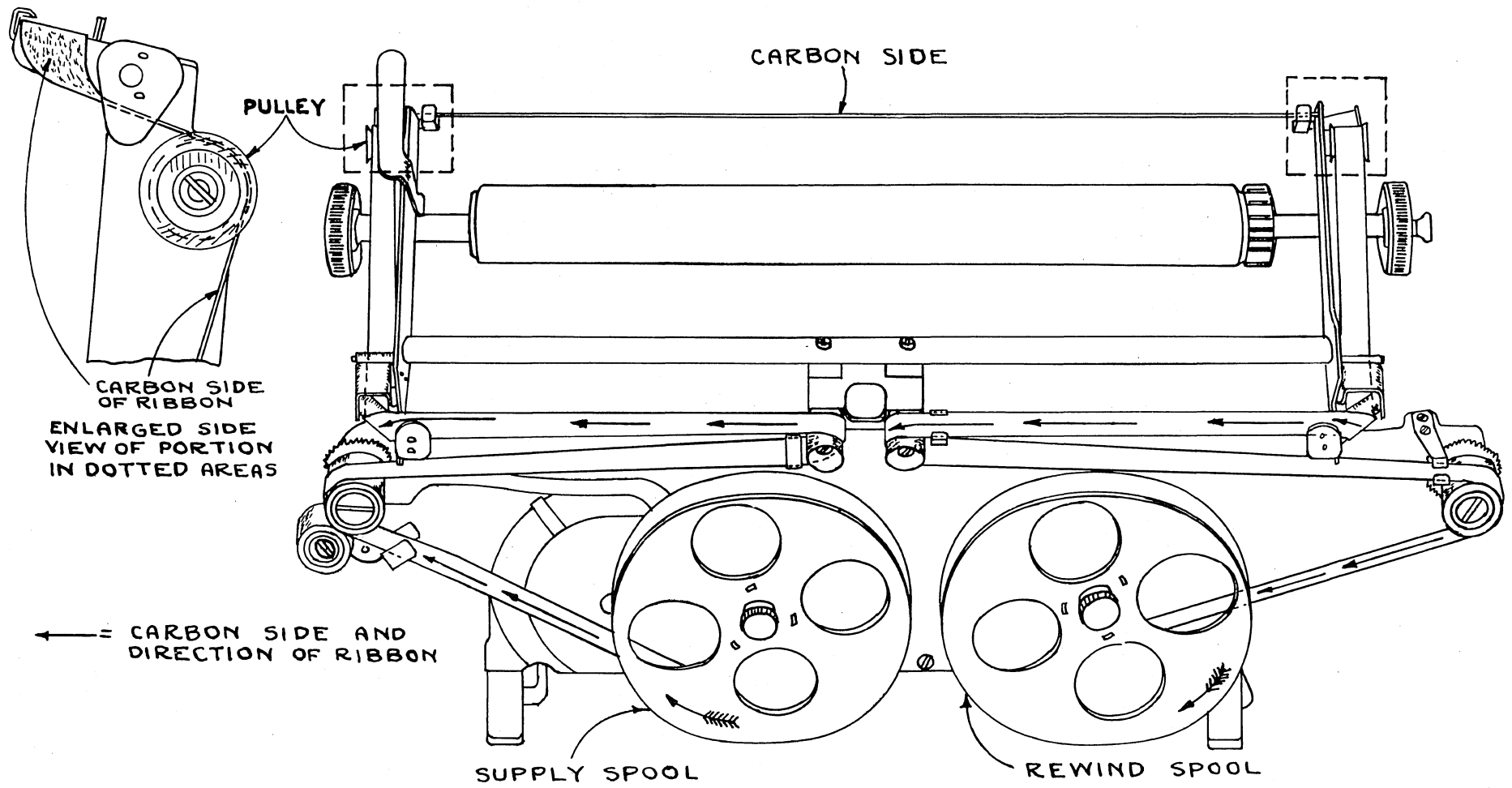
EMPHASIS OF UPPER CASE (CAPITAL) CHARACTERS The emphasizing of capital letters is made possible by the design of the type basket shift. The type basket does not shift vertically. It swings on four flat springs which are fastened to the rigid members of the machine.

When the basket is shifted for capital characters, it is brought down on an arc. This method of swinging the type basket from a pivot point increases the leverage of the type bars causing the upper case characters to strike the paper with a greater impulse, thus allowing the large area characters to print with the same density as the small ones.

May 1, 1939

REVIEW QUESTIONS

1. Why should the type bar enter the type guide correctly?
2. What are the results from a cam being set too far from the power roll?
3. How is "ring and cylinder" set when make six copies?
4. Should the bar be heavier on cylinder or on ring?
5. What is meant by "off feet"?
6. What is the purpose of the knock-over tool?
7. When should the maulers be used?
8. Why is a character used near the center of the key board as a guide bar?
9. How can the speed for stencil writing be determined?
10. What is the proper tool to use on this condition nmlmlmlm?
11. What is the proper tool to use on this condition NONNONONO?
12. What is the proper tool to use on this condition nxnaxnaxnaxn?
13. What is the proper tool to use on this condition NBNbnbnbnbn?
14. What is the proper tool to use on this condition ndndndnNDNDNDN?
15. What precautions should be used when making manifold copies?
16. How is the speed determined for manifold copies?
17. What effect will a worn type bar guide have on the alignment?
18. What effect will a heavier spring on the typr bar have on the strike-up?
19. What usually is the cause of a blurred character?
20. How can a type bar be adjusted to hit heavier?



MAR. 1, 1939

HEKTOWRITER

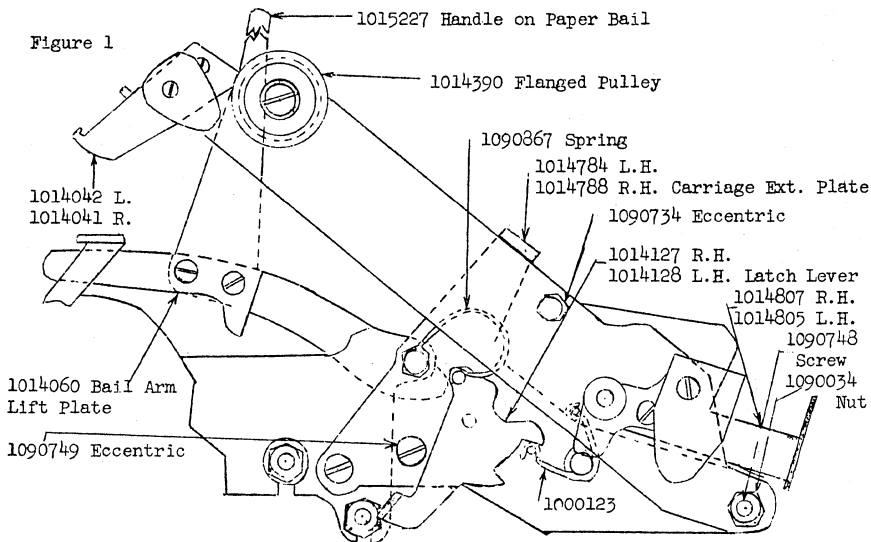
OPERATION The ribbon moves with the platen while typing. The carriage movement is transmitted through the drive tape to the right hand feed roll which unwinds the ribbon from the right hand spool. If the carriage were allowed to pull the ribbon directly from the spool, the ribbon would tend to "Tie up" in the corner guides. In this manner an unused section of ribbon is to the right of the platen--a section equal to that which has been typed on that line. When the carriage is returned, the pawls engage to hold the ribbon stationary and the platen moves behind the fresh section of ribbon.

As the carriage moves to the left during typing, the used section of tape is wound on the left spool by means of the drive spring. This spring must have only enough tension to wind the tape as additional tension tends to draw the ribbon tight in the guides and this is apt to break the ribbon or cause the carriage to tie up.

The ribbon is kept from moving during carriage return, tabulation and carriage movement, by operating the release levers and with the lift arm in the correspondence position by means of the pawls which engage and hold the corner ratchet wheels. When the lift arm is in the correspondence position, the brake is also effective in preventing the ribbon from moving.

FASTENING OF FRAME The Hektowriter frame is attached to the rear of the machine by three screws #1090946. The frame is kept parallel by three spacers which separate the frame from the base. Thus the frame is easily removable from the machine.

RIBBON CARRIER ASSEMBLY is hinged to the carriage end plate extensions by screws #1090748. These screws, which thread into the arms of the ribbon carrier, should be tightened, and then backed off a quarter to half a turn, before the nuts #1090034 are put on.



CORNER GUIDES (Front) (#1014041 R) (#1014042 L) The ribbon corner guides are held to the lift arm by screws #1090003. The guides have enlarged holes for adjustment. The left and right guides are set in the "high" position. The guides are then moved forward or backward until the ribbon just clears the platen when the arms are in the down position.

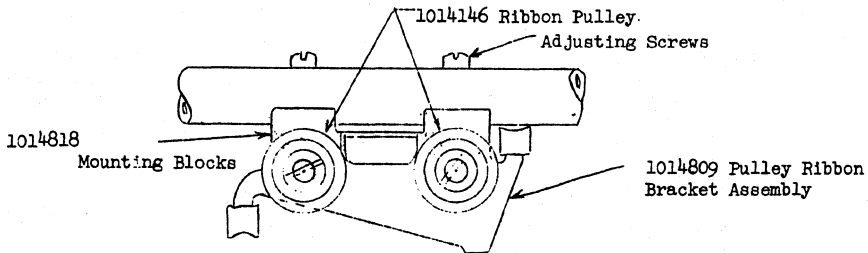
The guides must then be adjusted for equal height so the typing will be an equal distance from the edge of the ribbon on both ends of the line. This is done by lowering the high guide. The ribbon between the guides must be as tight on the top as on the bottom. Unequal tension on the edges of the ribbon will cause the ribbon to break. Type on the left end, then tabulate to the right end of the platen and type. The characters on the ribbon must be an equal distance from the edge.

The guides must be cleaned each day with alcohol to insure proper operation.

CORNER GUIDES (Rear) (#1014807 R) (#1014805 L) The rear corner guides should be set in a central position. See that the guides are so formed that the ribbon has equal tension on the edges.

PULLEY RIBBON BRACKET ASSEMBLY (#1014809) This assembly must be adjusted so the ribbon will not feed off the rollers. The two holes through which the screws pass where the assembly is fastened to the frame are enlarged for adjustment.

Figure 2



ECCENTRICS (#1090734) The eccentrics determine the position of the lower writing line on the ribbon. They must be adjusted so each touches the lift arm. The underscore should make a line $1/32$ " from the bottom edge of the ribbon. Type a full line with the underscore to be sure the guides are level. See fig. 1.

ECCENTRICS #1090749 on the Carriage Frame are the adjustment for the middle position of the ribbon. The underscore should strike the ribbon $3/16$ " from the bottom edge of the ribbon. Adjust the eccentrics so the lift arms rest on both eccentrics equally. See fig. 1.

LATCH LEVERS Left #1014128 Right #1014127 The latch levers provide a means of moving the ribbon from the lower to the central position. The hairpin spring (#1000123) on the right lever must be formed to avoid interference with the collar on the shaft. See fig. 1.

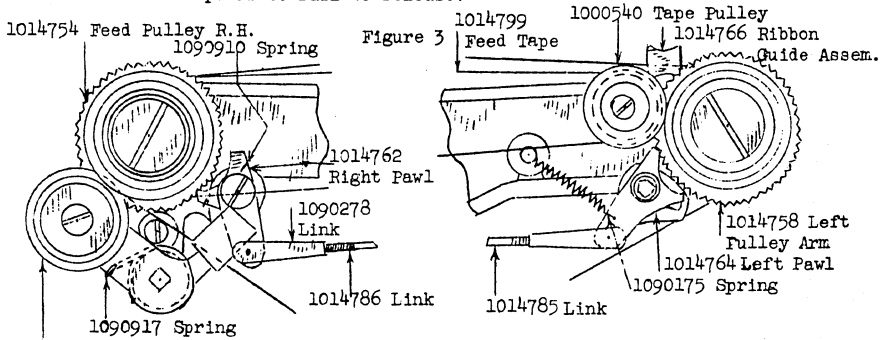
RATCHET PAWLS Left #1014764 Right #1014762 There are two pawls on each ratchet wheel. The inner pawls on each side are to limit the motion of the wheel to one direction. These pawls must be free.

The outside pawls are to lock the wheels to prevent feeding and rewinding during carriage movement other than escapement for typing.

The spring on the left of the rear frame keeps the pawls in the rest position.

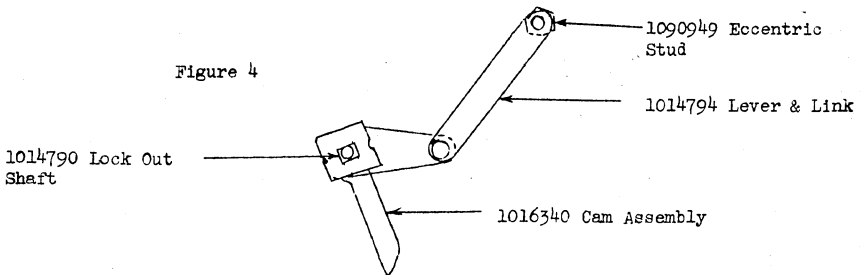
The two springs on the central vertical shaft allow the pawls to have movement when the ratchets turn from one tooth to the next. They also prevent the pawls from being forced into the teeth.

LINKS #1014785 & #1014786 The adjustable links are to be so adjusted that the pawls engage the ratchet teeth at exactly the same time. The pawls must safely reach the bottom of the teeth. In the rest position the pawls should clear the teeth approximately 1/16". There must be back-lash in the ratchets with the pawls engaged to allow the pawls to drop out freely. The only means of adjusting for back-lash is topeen or grind the pawls. No back-lash may result in a bind and cause the pawls to fail to release.

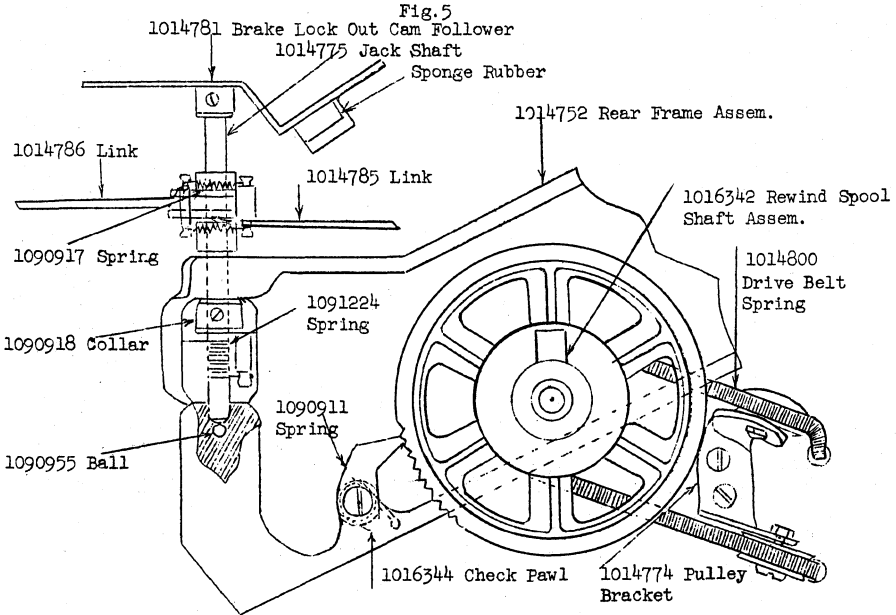


LOCK OUT SHAFT #1014790 There is a set screw under the left latch lever which holds the bushing of the lock out shaft in place. To remove the shaft, remove the screw and bushing.

The shaft should be kept clean so the cam assembly will operate freely. The rollers of the cam assembly should be oiled.



BRAKE #1014781 The purpose of the brake is to hold the rewind spool from turning while the carrier arms are in the "up" or correspondence position. If the rewind spool turns from jar of the machine, the slack will be taken up in the ribbon and the carriage may tie up. This may cause the machine to pile or the tabular to fail.



For tabulation, carriage return, and moving the carriage by using the carriage release levers, the brake is not designed to be effective even though it is moved nearly into engagement with the spool.

To adjust the brake, put the carrier arm in the "up" position. Adjust the brake pressure, by means of the eccentric stud #1090949, so there is sufficient pressure to keep the spool from turning during tabulation or other normal operation of the machine. Do not set the pressure harder than is necessary to accomplish the above as additional pressure puts a load on the cam assembly #1016430 which must be overcome for carriage movement.

DRIVE TAPE #1014799 The drive tape rotates the ribbon feed ratchet from the carriage movement. A spring #1090768 supplies tension to the tape. When the pawls are engaged in the ratchets, the tape slides over the pulley on the right hand feed ratchet. There are no adjustments other than the spring tension which should not require changing. See Fig. III

PRESSURE ROLLER ASSEMBLY #1014772 The spring of the pressure roller assembly must supply sufficient pressure to prevent the tape from slipping between the rollers.

The pressure roller must be parallel with the feed roller to keep the ribbon from feeding off the roller. See Fig III.

December 5, 1941

EWM CUSTOMER ENGINEERING DEPARTMENT
LETTER OF INSTRUCTION #60

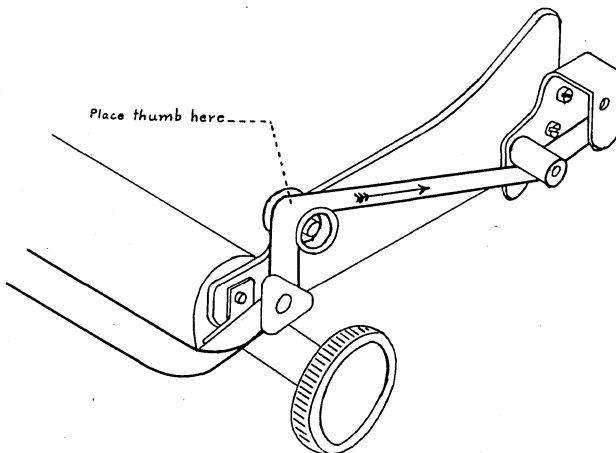
TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING SUPERVISORS, AND
EWM CUSTOMER ENGINEERS

SUBJECT: REDUCING HEKTO RIBBON BREAKAGE

The following procedure should be used to turn the Hektowriter platen back, after a correction has been made, without tearing the ribbon:

Place the thumb on the ribbon at the top of flanged pulley and exert a tension on the ribbon in the direction as shown by the arrow.

This will tighten the Hekto ribbon between the paper and the platen thus leaving the platen free to turn in either direction without catching the ribbon. Be sure to have the ball rolls off the paper for this operation.



R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman/jfs

June 10, 1942

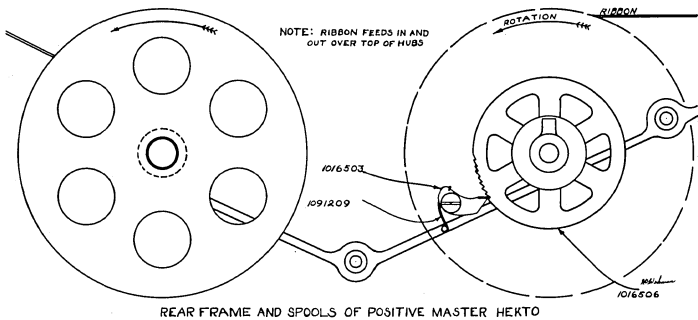
EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #74

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: POSITIVE MASTER HEKTOWRITER FOR GELATIN MASTERS

The positive master Hektowriter differs from the reverse master Hektowriter as follows:

The carbon coating on the ribbon faces away from the operator on the positive master machine. This is accomplished by using different guides with more angle, spaced away from the carriage about one-half inch. Both carbon paper spools rotate in a counter-clockwise direction with the ribbon coming off the top of the supply spool and going in the top of the rewind spool. The reversed rotation makes it necessary to reverse the rewind spool check pawl and spring.

The right-hand pressure roll guide is much higher to allow for the ribbon coming off the top of the supply spool.



In all correspondence concerning change-overs from reverse to positive Hektowriters be sure to give the machine serial number.

R. F. Sheridan
EWM Manager, Customer Engineering

HOWickman: jme

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #76

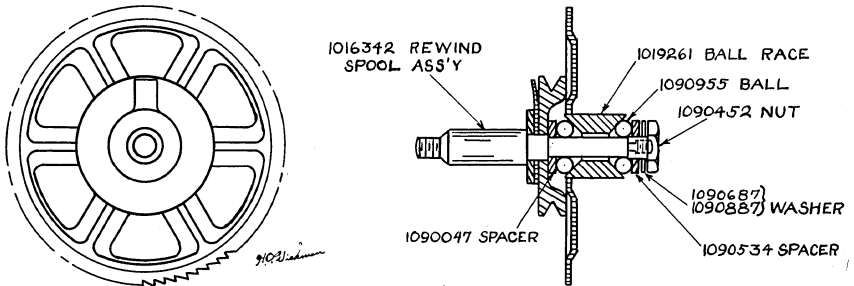
September 1, 1942

TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: NEW BALL BEARING FOR HEKTOWRITER REWIND SPOOL SHAFT #1019325

We have designed a ball bearing for the Hektowriter rewind spool shaft to eliminate feeding troubles created when the former bearing became worn or heavily loaded. This bearing cannot be installed on an old frame in the field because of the precise tools necessary for the drilling operation to accommodate the new assembly.

Old rear frames must be properly labeled and be sent to the factory at Rochester. The bearing will then be installed and the frame returned.

HEKTOWRITER REWIND BEARING



All hektowriters with serial number 68352 and up are equipped with this new bearing.

HOWickman:mfh

R. F. Sheridan
EWM Manager, Customer Engineering

DRIVE SPRING #1014800 The drive spring keeps a constant tension on the re-wind spool. This tension must be enough to wind the tape to insure enough space between characters on the ribbon. Overlapping of characters may indicate lack of tension on the drive spring. If there is too much tension on the spring, the ribbon will be pulled tight in the guides and the carriage may tie up on tabulation on carriage return.

To tighten the spring, cut out a section. To loosen the spring, stretch a long section. It may be necessary to shorten new springs to obtain the proper tension.

The drive spring should be crossed near the power roll pulley to drive the rewind spool in the correct direction. See Fig. V.

RATCHET ON REWIND SPOOL #1016342 Holds the tape from unwinding from the re-wind spool when the carriage is moving to the right.

CARRIAGE TENSION The carriage tension should be adjusted to start at approximately 2-1/4 pounds. This may be increased if required for tabulation.

TABULAR GOVERNOR The tabular governor is not connected on Hektowriter. Sufficient braking force is supplied by the ribbon.

TABULATION When tabulating, two or three character spaces are skipped on the ribbon. This results from the normal operation of the machine and cannot be eliminated by adjustments. If additional space is lost, it may be the result of too heavy a tension on the drive spring.

WORM HOUSING Starting approximately 44,250 serial number, the Hektowriter is equipped with a 12:1 gear ratio. The ratio is stamped on the bottom section of the housing.

PLATEN Q2 platen gives the best copies for the impression is deep enough to make a good contact with the duplicating paper.

RIBBONS The quality of work produced from the Hektowriter master is to a large extent dependent on the quality of the ribbon used. It is especially important that the ribbon be clean on the back. Some ribbons are flaked with ink on the back and the back edges are coated. This causes the ribbon to stick to the guides resulting in the carriage being slow in action. Ribbons are available which are clean on the back and much service trouble can be avoided by their use.

Ribbon Dimensions:

For Model A - 1/2" wide - 300 ft. long

For Model B - 9/16" wide - 300 ft. long

For Model C - 9/16" wide - 450 ft. long

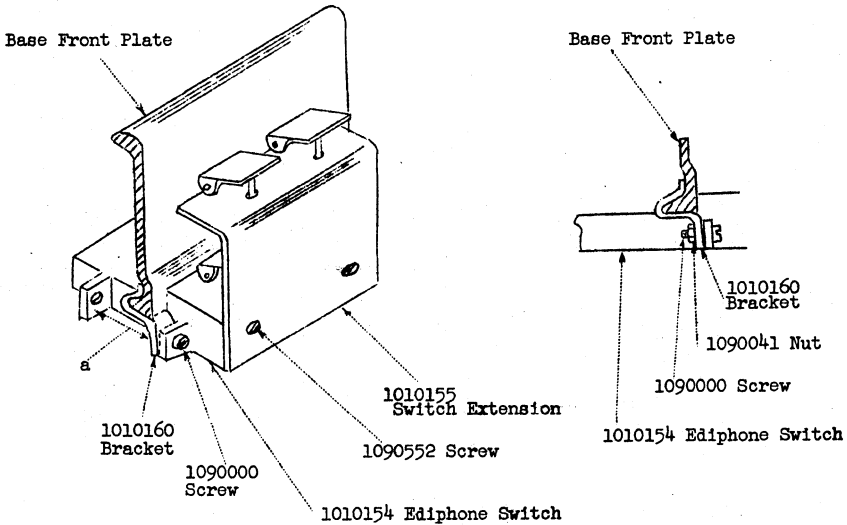
February 10, 1941

EDIPHONE TYPEASE EXTENSION

Supplied by Thomas A. Edison Inc.

THE PURPOSE of the extension is to raise the Typease control levers so they can be operated efficiently from the International keyboard.

The Typease switch extension operates the control levers on the Typease mechanism assembly by means of two auxiliary levers and shafts. These control levers start, stop, or repeat the speaking from the cylinder on the Ediphone transcribing machine.



Ediphone Switch Extension Assembly

INSTALLATION Remove the shaft, spring and hook between the bosses on the Typease shown at (a). Place the clamps 1010160, inside the International frame and fasten securely to the Typease with screws 1090000 and nuts 1090041.

Remove the two short screws on the front plate and fasten the extension using screws 1090552, these screws are longer to compensate for the added thickness.

Be sure that the cable from the Typease to the transcribing machine does not run under the power roll or near the cams. Run the cable to the side of the International under the keys and in front of one of the rubber feet along the outside of the typewriter base.

The Typease Extension is serviced by Thomas A. Edison, Inc.

May 1, 1939

DITTO

The Ditto Company have two methods of reproducing copies.

The flat bed machine which uses the gelatin roll must have the master written on the front of the sheet.

This can be obtained by using a ditto ribbon and inserting in the same way as the writing machine ribbon. Do not emboss master copy for the ink will produce heavy edges and light centers.

When using direct process place a sheet of ditto carbon, with the carbon side facing the master sheet. It is advisable to use a sheet of thin paper to prevent the cutting of the carbon paper. This method is used.

Use an aged #1 platen and have the speed of the machine down as low as possible and still have a good deposit of ink.

The Standard Duplicator and the Ormig are other duplicating methods used in the field and will produce the same results as the Ditto Liquid Duplicator.

The International Hektewriter is the ideal machine for writing the reverse masters for these machines. The correct amount of carbon is deposited to produce about 450 copies and at the same time show a good saving in carbon paper cost over the sheet carbon method.

MIMEOGRAPH

There are many different kinds of stencils on the market, but the more common ones are A. B. Dick and Remington.

The cushion sheet serves a two-fold purpose. It serves as a cushion sheet, preventing the cutting out of characters and it picks up the wax which is pushed away when the type strikes the stencil.

When adjusting the speed of a machine, set the impression indicator so that the period, comma and dash will just print. We recommend using a #1 platen.

In case you run into trouble the first thing each day and the trouble gradually clears up during the day, inquire about the condition of the stencils. If they are kept in a cool place, the wax becomes brittle and will cut out. Place the stencils near a radiator and warm up the platen.

The type should be cleaned quite often because a certain amount of wax is picked up and the type faces become filled up, causing blurry looking copies.

Instruct the operators not to use an excess amount of type cleaning fluid for it travels down the bars into the segment slots.

May 1, 1939.

When the stencil has been written, the cardboard backing sheet is torn off and the wax sheet is placed face down on the mimeograph machine. In the places where the wax is separated, the mimeograph ink which is inside the cylinder, is fed through a pad allowing even distribution all over the surface bringing out a distinct strike-up.

The reason why the Electric Writing Machine is the best stencil writer on the market is because the touch of the operator is entirely independent. Regardless of the amount of pressure exerted on the key levers, the characters come out the same; whereas on the manual machine an operator must be very careful how the round characters like the c-d-o-e-g-p are struck up.

MULTILITH

The multilith is a direct-to-plate application used with the carbon ribbon machine. The zinc plates used are about .005 thick and a lot of care should be used in handling them so as to eliminate any scratches or grease marks.

In some instances the customer wants to use both sides of the plate, therefore, the speed of the machine should be low enough to give a good impression and still not emboss the back of the plate.

Do not attempt to align any type from the plate strike-up. Make out a sample of work at different speeds and run the plate off on the multilith machine, picking the one which does not emboss and yet looks good. Use it as a guide in alignment. Before aligning any bars, it is advisable to use a different tension spring on the type bar, also to adjust the cam if possible.

A sheet of Kodaloid the same size as the zinc plate placed behind the plate helps to eliminate the plate embossing.

The spring off the ribbon lift bar should always be disconnected.

Lessen tension on right hand ribbon feed pawl.

Install a heavier spring #1,090,161 to give lighter impression.

Stretch out original spring to make bar print heavier.

Load the type bars for heavier impression by adding some solder to the type bars.

SHIPPING INSTRUCTIONS FOR FIELD MEN

PACKING

It is very important that a little thought and care be taken when packing shipments; in order that you may be assured of having packing material available when it is needed, it is advisable to save a few of the cartons, boxes and excelsior from some of the shipments which have been received in the past. Never under any circumstance should small parts be packed loose in a carton with a typewriter unless wrapped and padded in such a way as not to shake around loose in the carton. Even though the material being returned is defective, used, worn out, or merely being returned for credit, it should be packed carefully. It is also very important that the same method of packing be used as that at the factory. It is very often possible for us to salvage some parts of the stock returned even though the assembly as a whole is useless. If it is carelessly packed and becomes damaged, the parts may become a complete loss. A substantial saving may be made in postage, express charges, or freight charges by accumulating the stock before returning and making fewer but larger shipments.

ROUTING SHIPMENTS

Do not ship typewriters back to Rochester by express unless it is a rush repair job or for some other good reason. Route small shipments of parts, etc. weighing less than 30 pounds via express or parcel post, but use freight on all shipments weighing more than 30 pounds. Uninsured parcel post rates are usually less than the express rates and is therefore more desirable than express. If parcel post is used, be sure and see that the regulation fourth class mail postal instructions are visible on the outside of the package authorizing the postmaster to "open for postal inspection". The post office will charge the regular first class letter rate if this notation is not on the package. It is advisable to use the standard company fourth class shipping labels which have this notation printed on the left margin. All of the motor carriers and most of the railroads give free store door pickup service and it is only necessary to call the carrier for a pickup. Perhaps the simplest procedure in most cases would be to call the same carrier that is used in shipping your freight from Rochester. This practice would assure the use of perhaps the most reliable carrier.

DAMAGED SHIPMENTS

When a shipment has been discovered damaged in transit, don't return the same to Rochester for repairs until you have notified the agent of the carrier in your town and shipment has been inspected by a representative of the carrier. These instructions are extremely important as it is impossible to file a claim for concealed damage unless shipment has been inspected by the carrier exactly as received at the destination. It is also important to notify Mr. LeRoy in the shipping department at the factory of damaged shipment in order that he may prepare claim for damages against the carrier.

May 1, 1939

November 16, 1942

EWM CUSTOMER ENGINEERING
INSTRUCTION MEMORANDUM #78

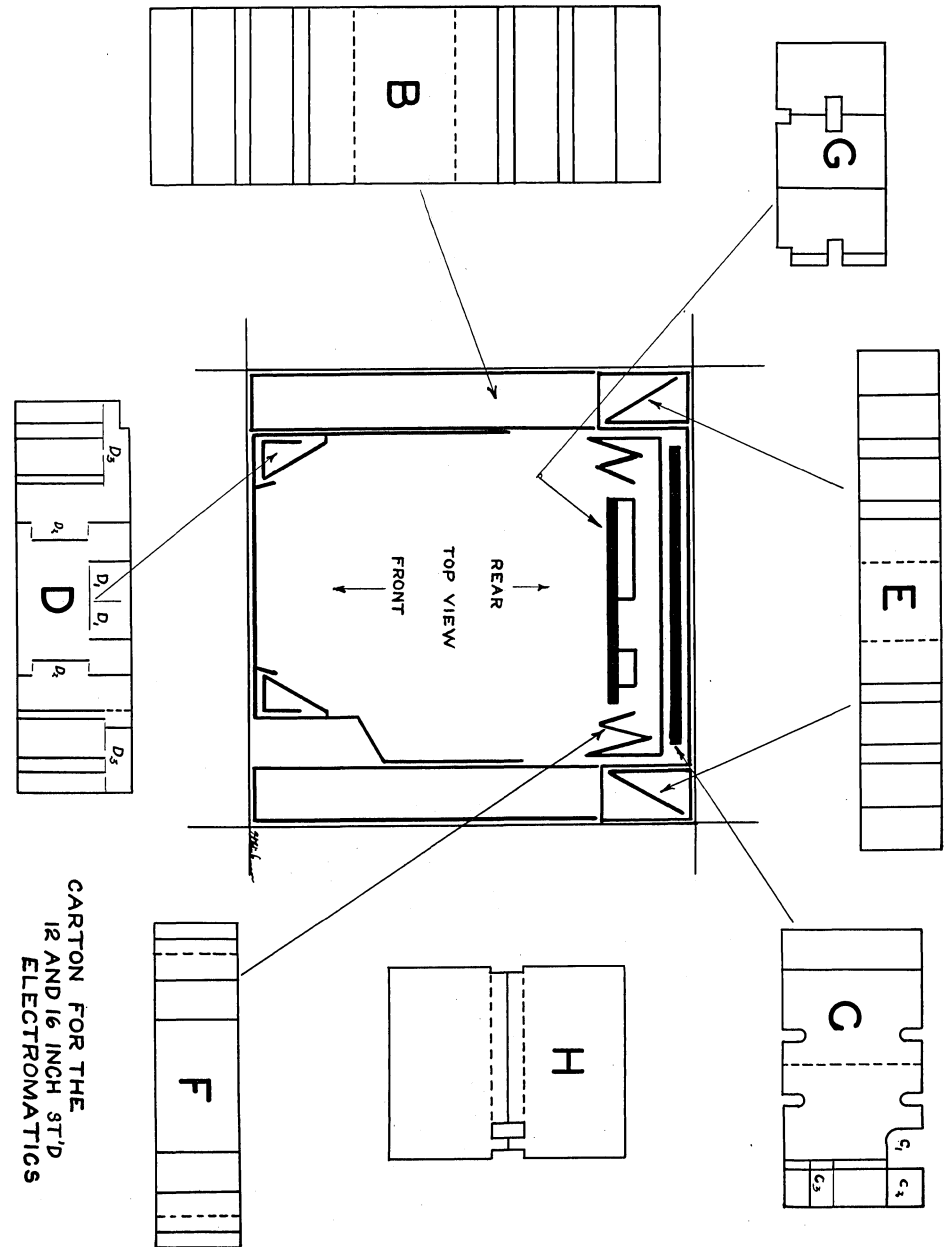
TO: IBM CUSTOMER ENGINEERING SUPERVISORS AND EWM CUSTOMER ENGINEERS
SUBJECT: INSTRUCTIONS FOR PACKING 12" AND 16" STANDARD ELECTROMATICS.

The following paragraphs and accompanying drawings describe the proper method of packing our 12" and 16" machines. It is important to remember that on the drawings a solid line represents a crease toward, and the dotted line a crease away from, the packer.

1. First set up the carton shell and glue the four bottom flaps in place. Now tape the seams.
2. Piece (B) is folded from both ends to form rectangular tubes, and is inserted in the carton to form a cradle for the machine.
3. Place the machine in the carton so that the rectangular tubes of piece (B) extend along the side of the machine. Leave room in the front and back between machine and carton.
4. Piece (C) is folded starting with the small flaps shown on the R.H. end. These flaps are folded up tight to the body of piece (C). Piece (C) is then placed in back of the typewriter with cutout (C1) opposite motor end plate.
5. Piece (D) is folded from either end. As the folding takes place, the door marked (D1) is held back and the window (D2) is held open to act as a lock to hold the folded wings in position. This piece is then pushed into place in front of the machine with the pants marked (D3) extending along the sides of the machine.
6. Piece (E) is folded similar to piece (B) and is inserted between (C) and the carton wall.
7. Piece (F) is folded to form a spring wall to hold the carriage in place. Because the spring tension in these folds is broken down by the vibration of shipping, we suggest that tissue paper be forced into these folds on one end to prevent too much movement of the carriage.
8. (G) is folded as shown, starting from left and working toward the right. Tape the main folds together and insert in carton with little flaps facing back of carton and cutout over the tab key set finger.
9. The top piece (H) is folded to form a (V) in its center and is inserted to accommodate piece (C & G).
10. Now close flaps, glue and tape.

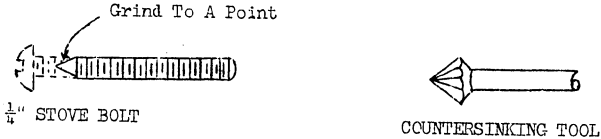
HOWickman:mfh

R. F. Sheridan
EWM Manager, Customer Engineering



INSTALLING MACHINE

When a machine is to be fastened to a desk either for a trial or because it is a permanent job, it is quite essential that markers be used to locate the holes. The markers are usually made from 1/4" stove bolts, and the heads cut off and ground to a point.



The machine should be set back approximately 2" from the front edge of the well board depending on the style of desk. The reason for the above is to allow the desk cover to close level with the top of the desk. Otherwise, the front plate on the typewriter will hit on the top. Also the machine should set in center of the desk well.

If the typewriter is to be fastened to a sliding board, it will be necessary to countersink the hole with a proper tool to allow the head of the 1/4" screw to clear the bottom board.

When the machine has to be raised to clear the ends of the carriage, install different bolts in the feet and either use 1/4" nuts as spacers or use a rubber roller off the rear feed roll and cut it to size. By keeping the rear of the machine up, it does not change the position of the keyboard to any degree.

When adjusting the operator's chair, the elbows of the operator should be about level with the keyboard.

Note:- In some cases it is advisable to install rubber bushings in the holes drilled in the desk to remove some of the desk noise. This is more common in steel desks.

If a machine is fastened down solid, it will sometimes cause the tabulation trouble.

DUTIES OF A SERVICEMAN

1. Keep your department always looking clean.
2. Keep your machines in A-1 shape.
3. Make out your reports daily and return to Rochester weekly.
As well as the warranty parts.
4. Keep your machine performance charts up.
5. Always keep busy.
6. Give good service to your customers. This means instant service,
not half hour.
7. Favor the customer and operator. Operator never wrong.
Use a little psychology.
8. Carry proper supply of parts to reduce working time.
9. Keep up your quarterly inspections.
10. Obtain all information about call on the phone.
11. Be able to instruct an operator.
12. Remember that when the serviceman is called, it is because of
trouble, and conditions with an office manager or superintendent
and operator are not 100%, you must cope with this condition.
13. Take your time and be thorough on the adjustments. Eliminate
call backs.
14. Make sure you have a clean cloth in your service kit, also
keep service kit neat.

May 1, 1939

FORMSWRITER

ASSEMBLY INSTRUCTIONS

The Formswriter is shipped in three sections:

1. Base Assembly
 2. Forms Track Assembly and Platen Closing Cam Assembly
 3. Machine Assembly
1. Place the machine on the base with the feet in the holes of the base.
 2. Place the forms track on the rails, sliding the forms track connector on the margin rack into the groove on the forms track, Fig. 4. The four rollers should touch the rails, if not, twist track slightly by hand.
 3. Attach the platen closing cam assembly to the carriage, Fig. 1.
 4. Thread the cord through the pulleys, Fig. 1 & 9. Be careful not to cut the outer fibres of the cords on the guides. Position the guides so the cord does not rub on them.
 5. Raise the forms track at the rear (with the track to the left as far as possible) and wind the parallel drive shaft #1015417, Fig. 7, approximately one-half turn. Lower the forms carrier onto the gears, making sure there is a slight amount of back-lash between gears and rack. Too much tension adds to the load of the carriage return and back spacer. Too little tension may result in type piling. There should be enough tension for tabulating one stop with the carriage at the left.
 6. Set the formica blocks into the groove of the carrier support rails, Fig. 7, and tighten the hex. screws securely. Check for binds. The blocks must fit freely into the grooves to prevent binding.
 7. See Page 2 for adjustment of the third rail.

MACHINE ASSEMBLY

PLATENS - The lifting platen carriage of the Formswriter is equipped with a #6 platen unless otherwise specified. This platen is of the same grade rubber as the #1, but is 1/32" undersize. For various platens available, see Page 2, Section 13. The same style of platens are used on all lifting platen machines.

RING AND CYLINDER - Unless sample forms are sent with an order, the ring and cylinder on all lifting platen machines is adjusted to .020" of paper which is approximately a five-part form.

This adjustment is made by the turn buckle #1013870, Fig. 4, which is located on each side of the carriage frame. Nuts #1090034 must be loosened before adjusting the turn buckle.

NOTE: After making the ring and cylinder adjustment, always check the index pawl #1012724 for entering the platen ratchet correctly. Also, when the index pawl bottoms on the stop #1012801, the detent roller #1000305 must be adjusted correctly to the ratchet teeth. See Page 2, Section 11.

NOTE: This adjustment also affects the paper clearance which is set to the form being used so that it can be shifted easily to straighten the paper.

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FEED ROLL PRESSURE - The feed roll pressure is applied by the coil spring #1090672 under the platen lift arm, Fig. 5-C. The pressure can be increased or decreased by adjusting the screw #1090673 under the center of the carriage frame. The screw is adjusted by standing the machine on its back and loosening the lock nut #1090669 with a 3/8" socket wrench. See Fig. 5-C.

LATCH KEEPERS - (Left #1013335 and Right #1013334). The keepers must be adjusted to the thickness of the form used. If adjusted too low, the platen will latch hard. If adjusted too high, there will not be sufficient feed roll pressure, allowing the forms to slip. With the forms in place, adjust the keepers so there is a small play between the keepers and the latches when pressing down on the platen (approximately 1/64"). Adjust both sides equally. The keepers are adjusted by loosening the two nuts holding the keepers to the carriage frame and turning the eccentric nut #1090779 to raise or lower as required.

ECCENTRIC ON LEFT PLATEN LIFT LEVER - The eccentric works in conjunction with the latch and the trigger arm on the feed roll release. The latch catch assembly #1013350 is adjusted by the eccentric #1090818 so that the latch will just touch the keeper #1013335 when the platen comes down into position. Proper adjustments on the eccentric save wear on the latches and keepers, Fig. 1.

PAPER CLEARANCE - This adjustment is made by loosening nut #1090688 and moving arm #1013329 either up or down. Set the clearance at a minimum for the thickness of form used to prevent carbon marking as the feed rolls release into position. After making the adjustments, check the feed roll pressure.

ECCENTRIC ON RIGHT PLATEN LIFT ARM (FIG. 2) - The eccentric #1090734 operates in connection with the right hand platen latch to determine the depth of engagement of the latch with the keeper. Adjust the eccentric #1090734 so the latch engages the keeper half way back on the latching surface.

WORM HOUSING AND CLUTCH PULLEY - A twelve to one (12:1) gear ratio worm housing is used on the Formwriter so that the motor will deliver greater power for carriage return and back spacing to take care of the additional load. The housing is identified by the number 12 stamped in the casting.

The second stage clutch pulley #1015356 has been found to be the most suitable for the Formwriter. This is identified by two notches in the edge of the pulley.

THIRD RAIL - A third rail is used to resist the load on carriage rollers when closing the platen. The rail is adjusted so the roller does not quite touch the rail unless a slight force is applied to the rear of the carriage. The reason for this being that the roller is unnecessary during the normal operation of the machine, but resists excessive loads when applied.

The third rail is adjusted so there is paper clearance (.003") between the rail and the roller. The holes in the arms holding the rail to the rear of the base are enlarged for adjustment.

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MARGIN RACK AND CONNECTOR (FIG. 3-A) - A special margin rack with a connector assembly is used on the Formwriter. The connector is the means of moving the forms track with the carriage.

PLATEN LIFTING SPRINGS - There are three springs in retainers to lift the platen. These springs must be ordered and installed as assemblies. They are not adjustable. One spring assembly #1015450 is required and two spring assemblies #1015444 are required.

CLOSING CAM ASSEMBLY

THE PAPER TABLE - The paper table is removed from the closing cam by unhooking two springs #1090171, Fig. 3, which hold it to the cam side plates. First, remove the stop and paper clamp.

TEAR-OFF BLADE - The tear-off blade is held to the paper table by two shoulder rivets. The paper blade is not adjustable and cannot be made adjustable because of patents. However, the blade can be fastened to the paper table at the factory to fit a specific form so that when the form is set at the first writing line after shifting the carbon, the tear-off blade will coincide with the perforations.

PAPER CLAMP SLIDE - The paper clamp slide is made in various lengths for different length forms. The standard lengths are 6" #15472, 11 $\frac{1}{4}$ " #16521, and 15 $\frac{1}{2}$ " #15471. A sample of the form should accompany the order. The slide is removed by first removing the paper table and then removing three screws which hold the slide in place.

PAPER CLAMP (FIG. 5 & 6) - The sliding paper clamp moves in the clamp slide on four formica rollers. These rollers run on two eccentric studs on the left and two plain studs on the right side of the clamp. By means of the eccentric studs, the clamp is adjusted to run freely without excessive play in the slide. There is a hole in the slide through which this adjustment is made.

The slot in the clamp has been made shallow in event it is necessary to write close to the top of the form. In some cases, the slot may be too shallow to get a sufficient grip on the forms. If this causes trouble, the slot can be filed deeper to obtain a better grip on the forms.

DRAW CORD SPRING PULLEY (FIG. 5-B) - The purpose of the draw cord spring pulley is to take up slack in cord. The spring pulley #1015473 pulls in a clockwise direction and should have only enough tension to keep the cord taut. A slack cord will get caught in the pulley guides or around other parts.

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FORMS TRACK AND TRUCK

"V" BELT (FIG. 9) - The purpose of the "v" belt is to provide a means of positioning the blade support stop. Tension is maintained by means of an idler pulley, Fig. 9-C. The belt tension is adjusted by means of the screw #1090930, which is reached through a hole in the rear paper guide plate. The belt must be kept tight.

OPERATING CORDS (FIG. 9) - There are three operating cords. Cord #1015558 extends from the pulley on the platen closing cam to the forward end of the retracting spring. Cord #1014913 extends from the rear of the retracting spring around a pulley and to the rear of pulley slide assembly #1014702, Fig. 9-D. Cord #1014909 extends from the blade support truck stop, forward around guide (snubber) #1014683, back through the pulley block, and is fastened to the blade carrier truck.

Cord #1015558 is 27" long
Cord #1014913 is 17" long
Cord #1014909 is 48" long

The correct adjustment for the length of the cord and spring system should be made at "A" Fig. 9-D. It should be necessary to make this adjustment only when replacing a cord, or if the cord should stretch. If the cord is short, the platen closing cam will not tip forward to the top cover guide and long forms will not line space near the end of the forms because the spring tension is becoming effective.

The paper clamp slide should tip forward so that the closing cam touches the guard on the top cover and should "float" in this position. If the cord is long, the blade support truck will not go all the way back because of lack of tension.

RETRACTING SPRING - The spring #1091237 supplies the tension to retract the carbon paper.

BLADE SUPPORT TRUCK - See Fig. 10. The blade support truck is adjusted to the track by eccentric screws #1091092 which act as a bearing for the formica rollers. Adjust these eccentrics so the truck is parallel to the track, has a minimum of play and rolls freely.

BLADE SUPPORT - The blade support is made in 12" and 16" lengths. The same support uses fanfold or open web blades, the difference being in the blades themselves. Thus, combinations of blades can be used in the same holder. There is no difference between left and right fanfold blades.

Open web blades are held in both posts. Fanfold blades are held in one post only.

In the 12" and 16" blade supports, there are three styles:

1. For 8 blades
2. For 12 blades
3. For 16 blades

The blade support is removed by pressing lever #1014905.

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THE GEAR RACKS #1014735 (FIG. 7) - These racks are adjusted to have the proper clearance with the formica gears on the parallel drive shaft. The holes in the racks are elongated for vertical adjustment. This adjustment is carefully set at the factory and should not be disturbed unless it is absolutely necessary.

CARBON PAPER - The actual carbon length which can be used is 26". A 27 $\frac{1}{2}$ " sheet allows 1 $\frac{1}{2}$ " for folding around the blade.

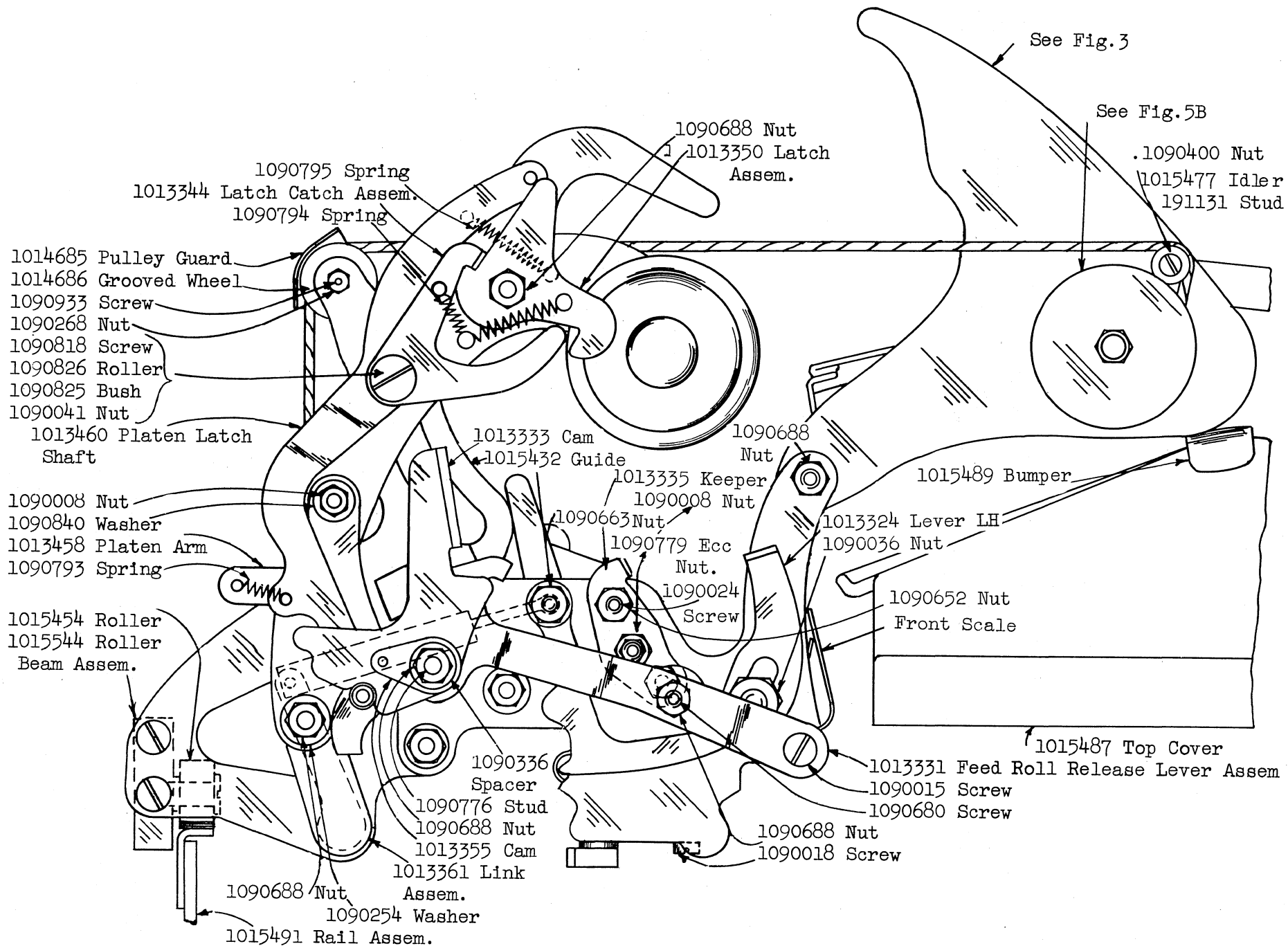
CLIPS - When clips are used to hold the carbon paper, staggering them reduces friction of the carbon paper. To prevent tearing of the carbon paper, fold a piece of bond paper over the carbon fold before putting on the clip.

WHEN THE MACHINE FAILS TO TABULATE OR LETTERS PILE - Usually, it is caused by the lack of sufficient main spring tension in the forms carrier itself, thereby leaving the carriage main spring to do all the work. This spring should have sufficient tension so the machine will tabulate one letter space with carriage in left hand writing position, and letters will not pile.

To increase the spring tension, loosen the hex. screws just back of the carrier rail supports, slide the formica blocks out of the carrier support rails, and raise the carrier truck above the fibre gear. Wind the spring slightly by turning the shaft. Replace the guide blocks and tighten the screws to prevent the track from leaving the supports.

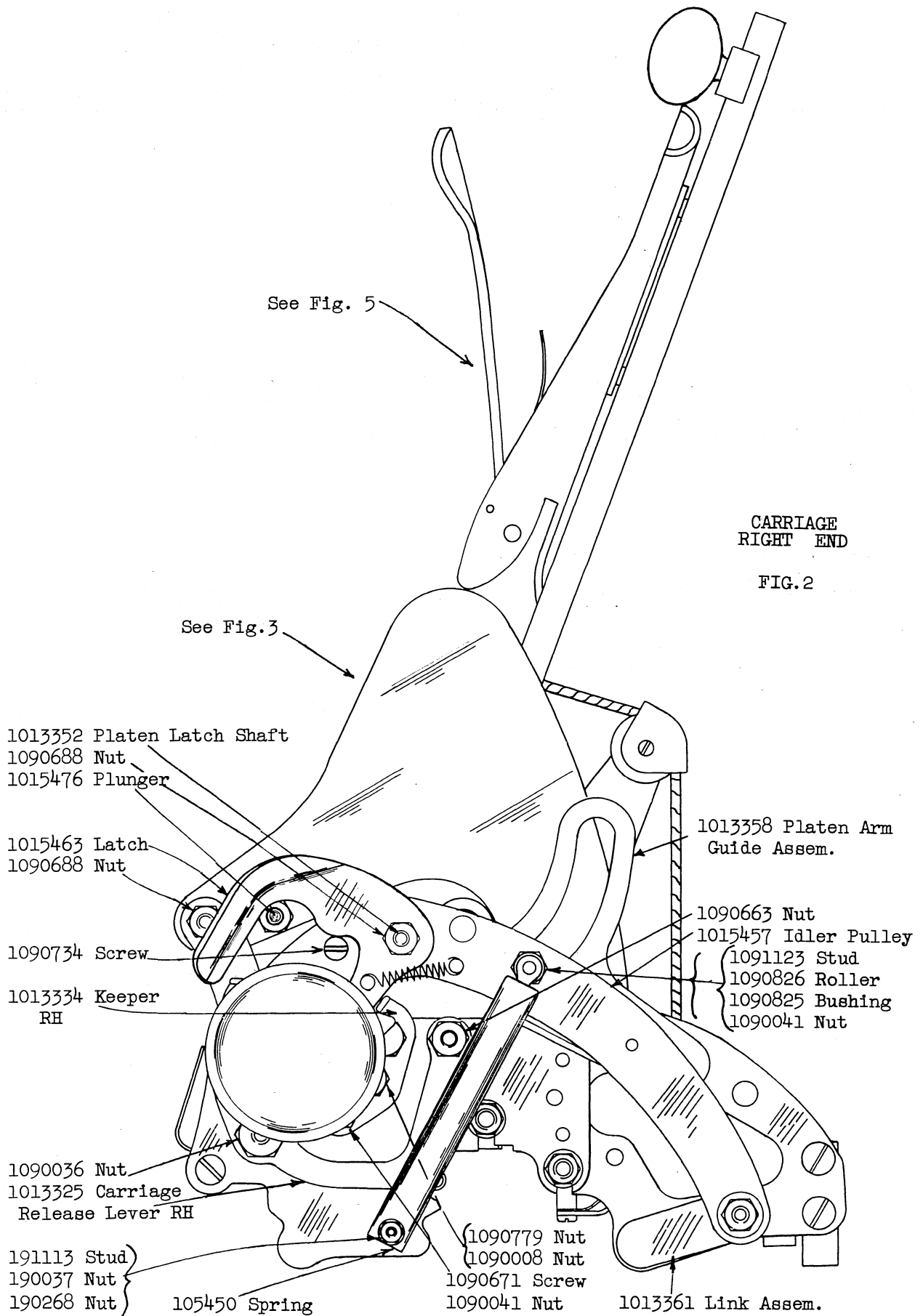
Separating or spacing the blades, as a general rule, will not allow the carbon to shift more freely as may be supposed. The higher blades are from the track, the greater the snubbing action becomes between the carbons and the forms as they pass beneath the platen when it is raised. Keep the carbon blades in the lowest slots in the blade support.

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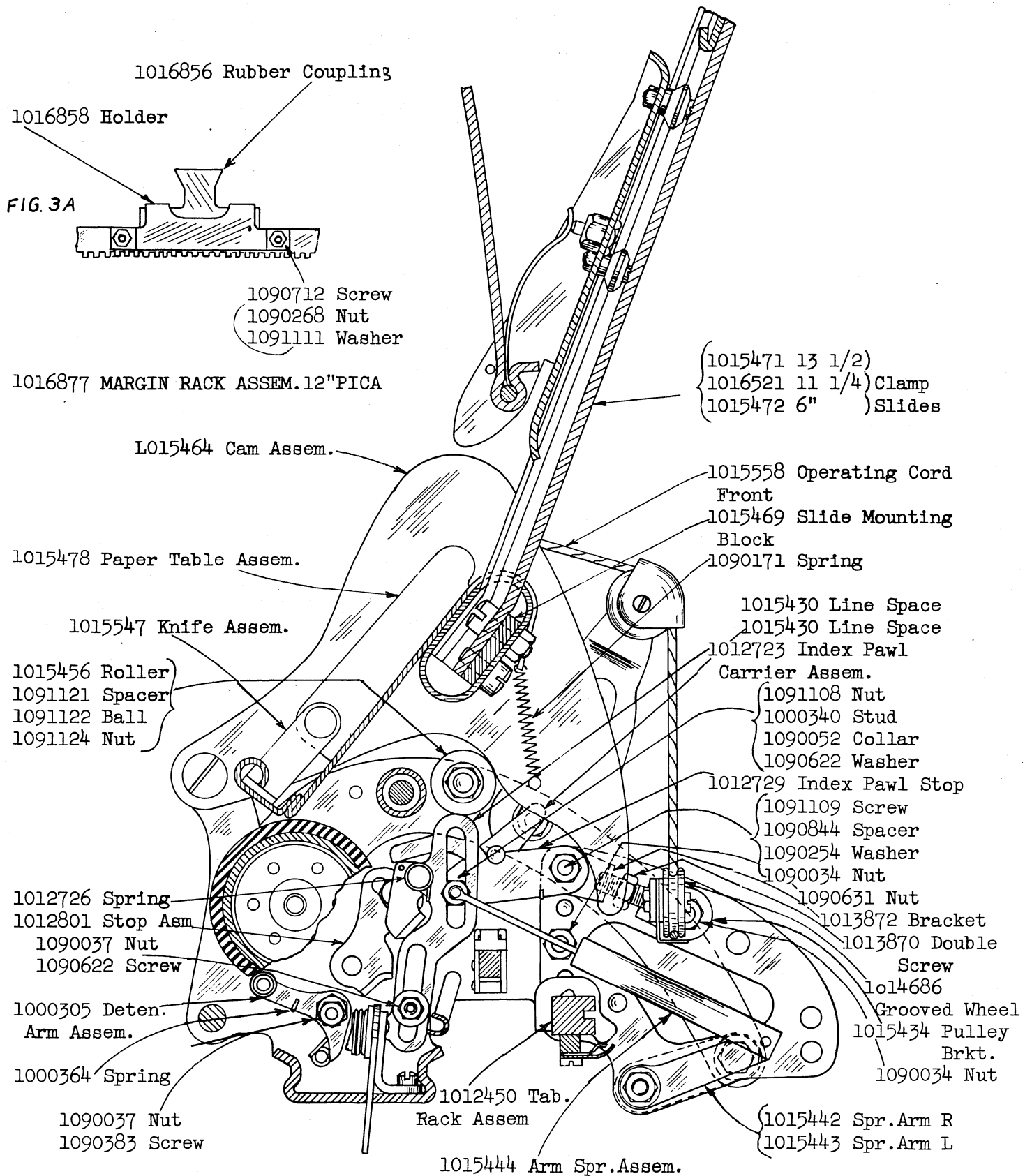


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CARRIAGE LEFT END - FIGURE 1

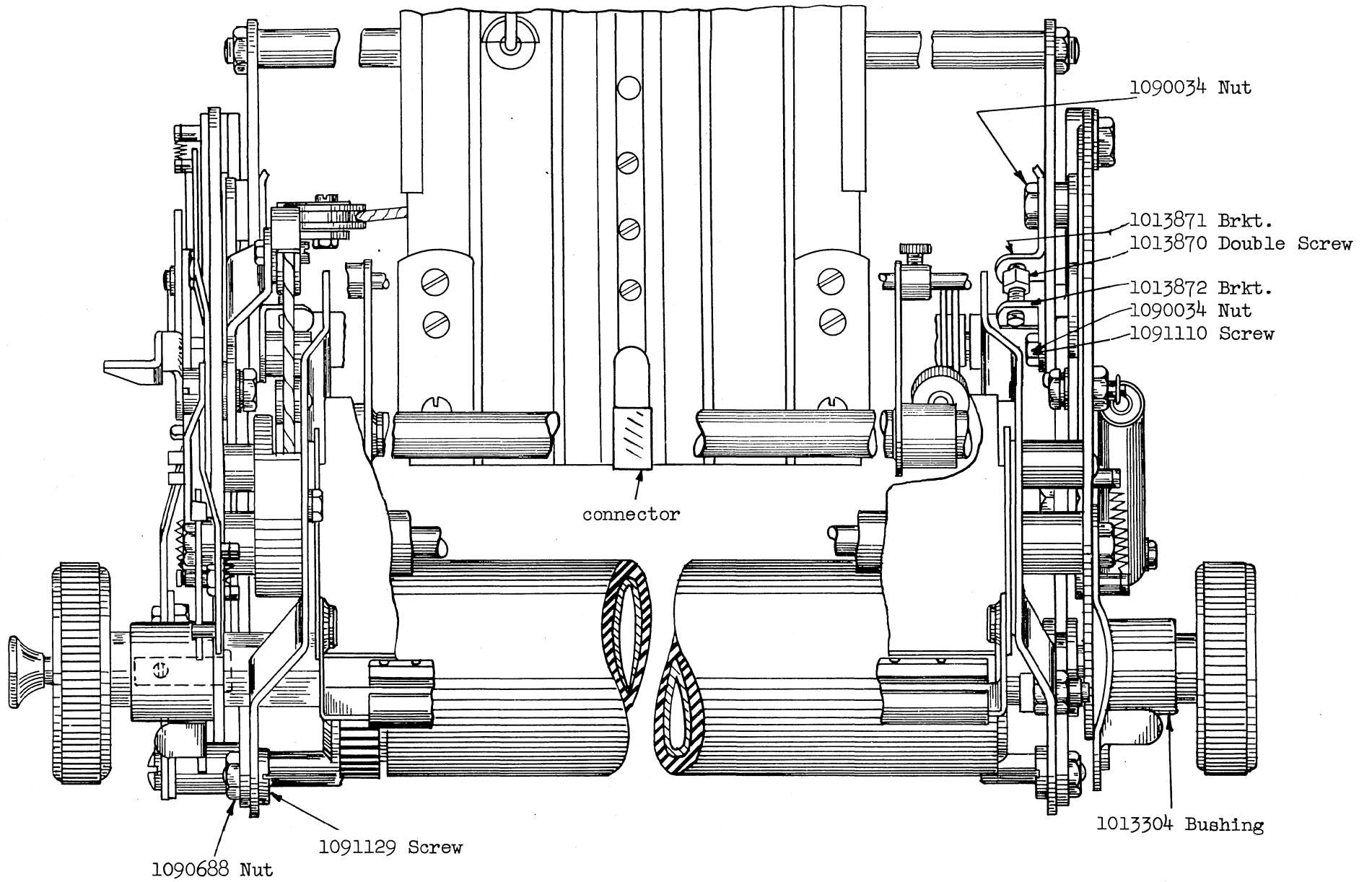


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CARRIAGE INSIDE LEFT FIG. 3



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CARRIAGE TOP VIEW FIG. 4

LONG FORM CLAMP (SLIDING) FIG. 5

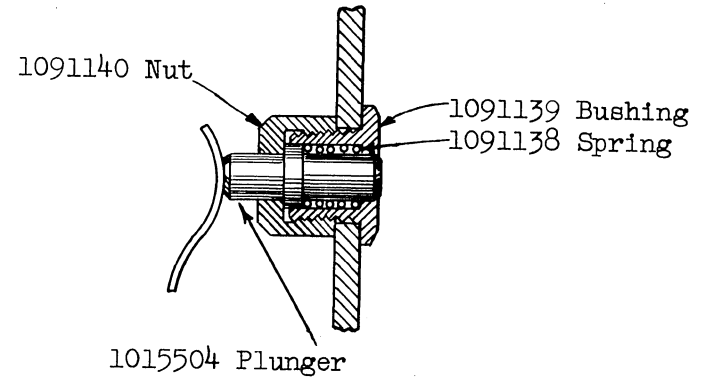
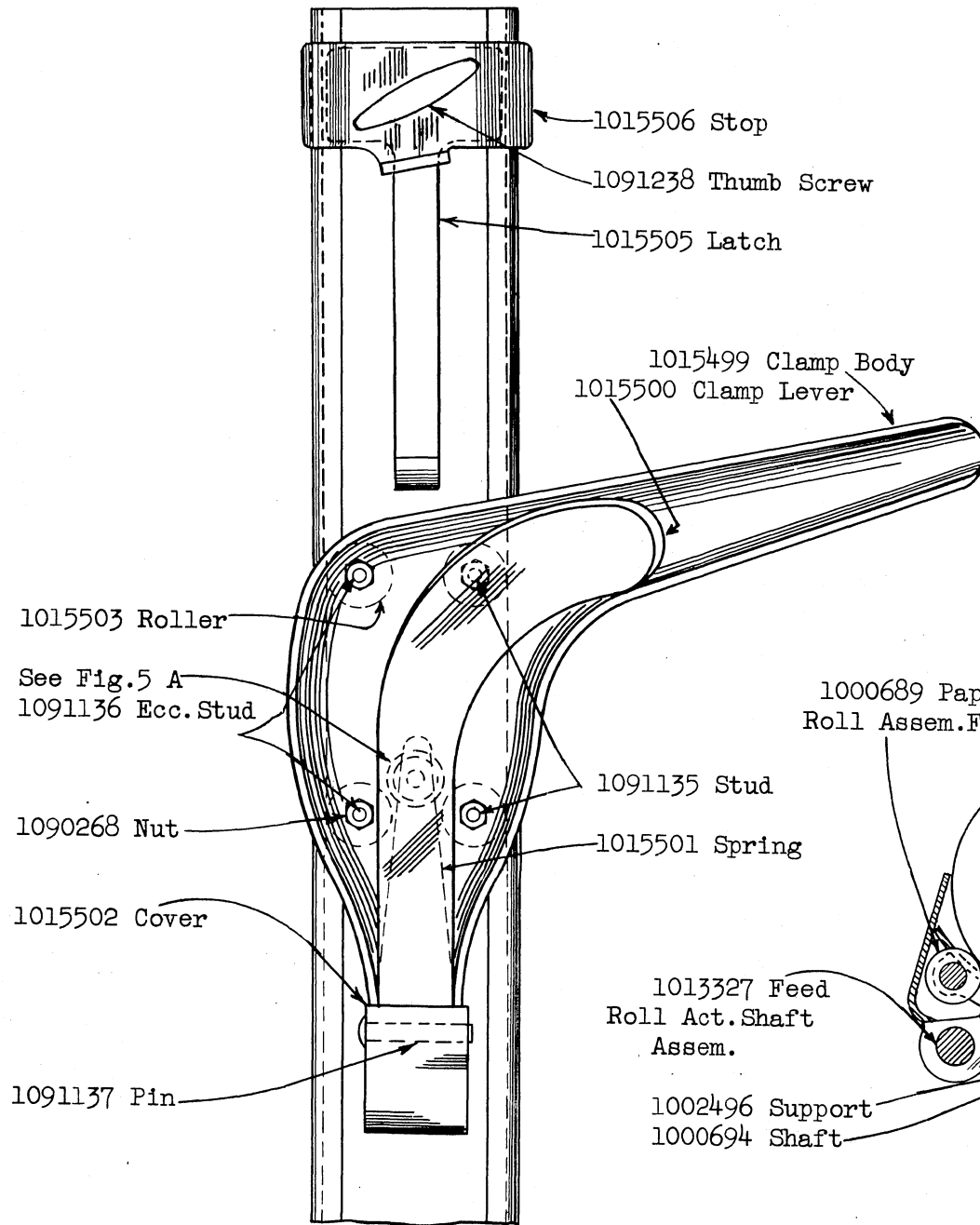


FIG. 5A

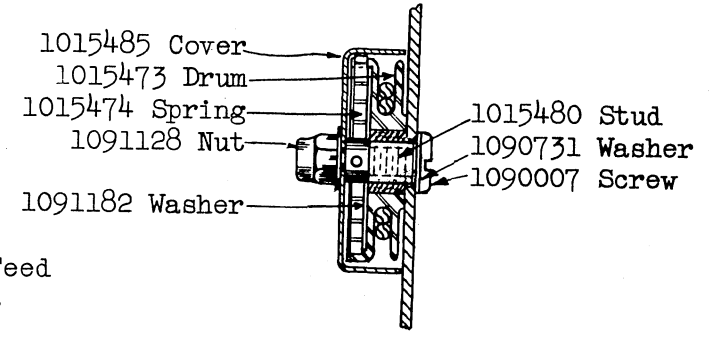


FIG. 5B

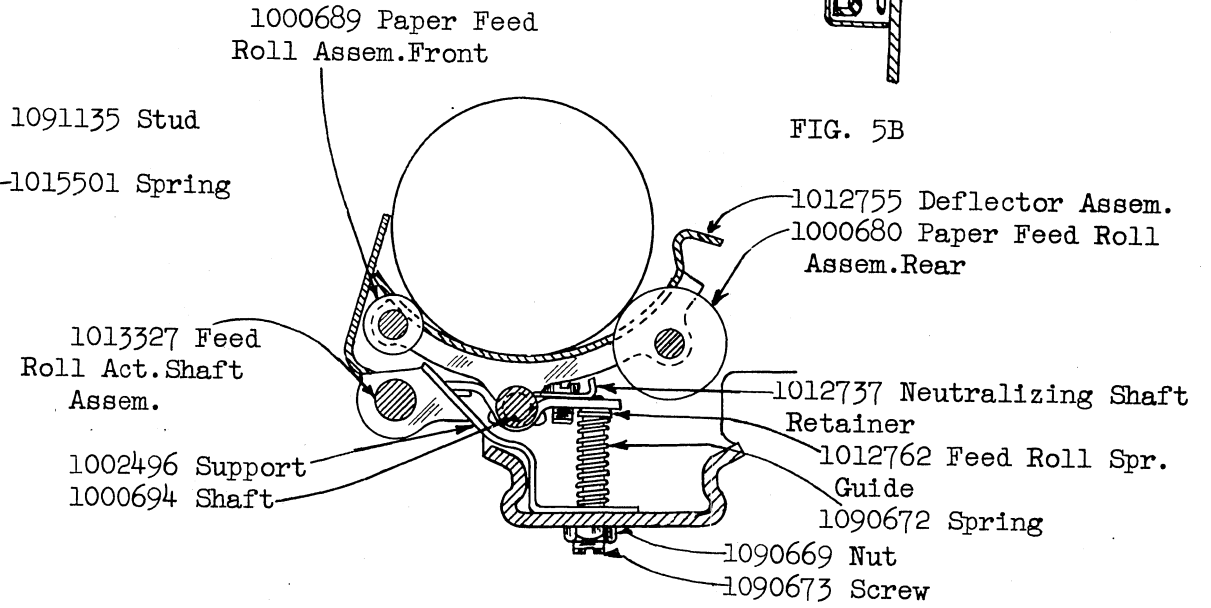


FIG 5C

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SHORT FORM CLAMP - (Stationary) FIG. 6

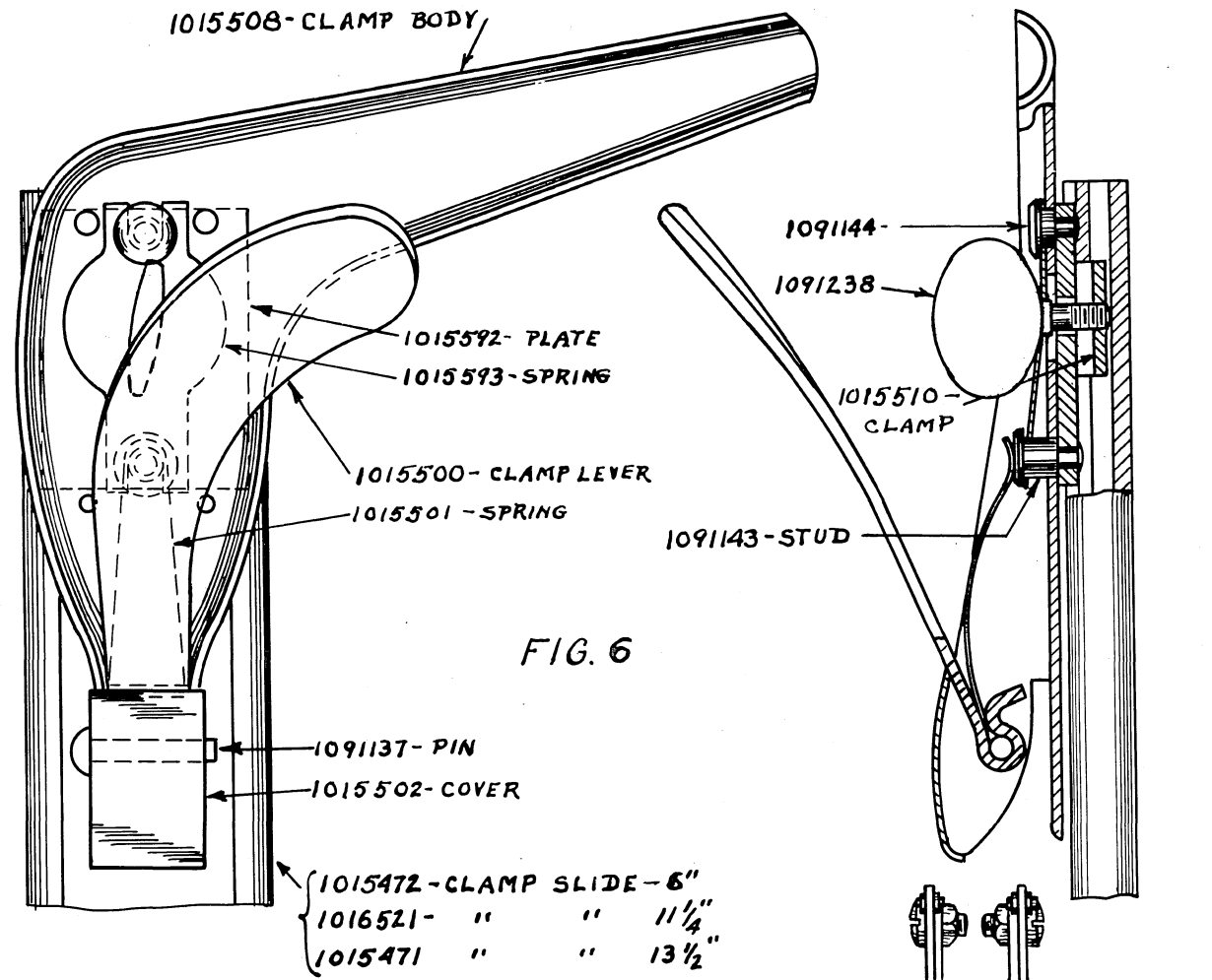


FIG. 6

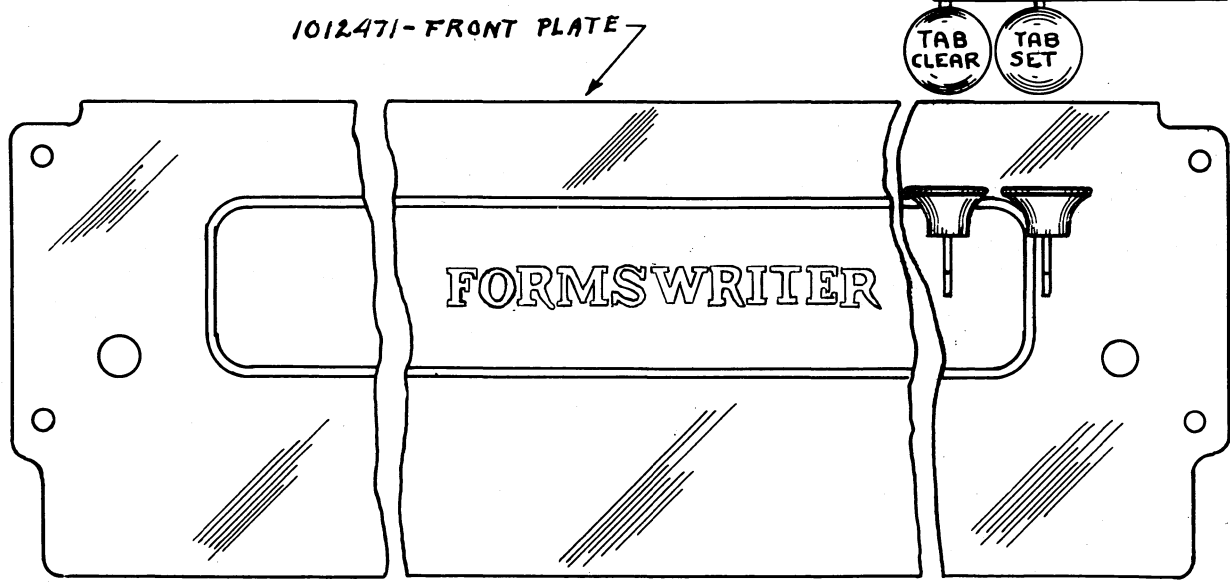
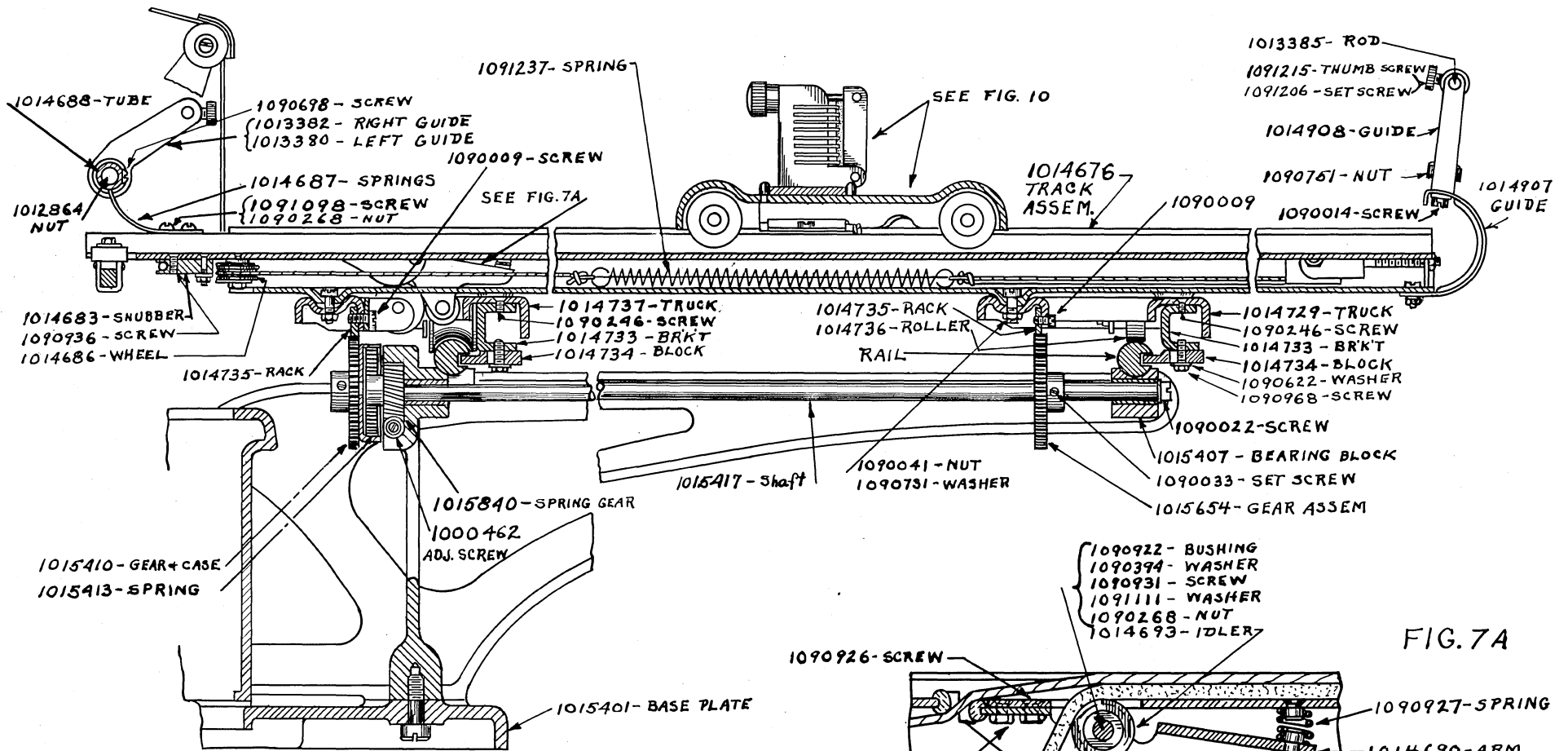


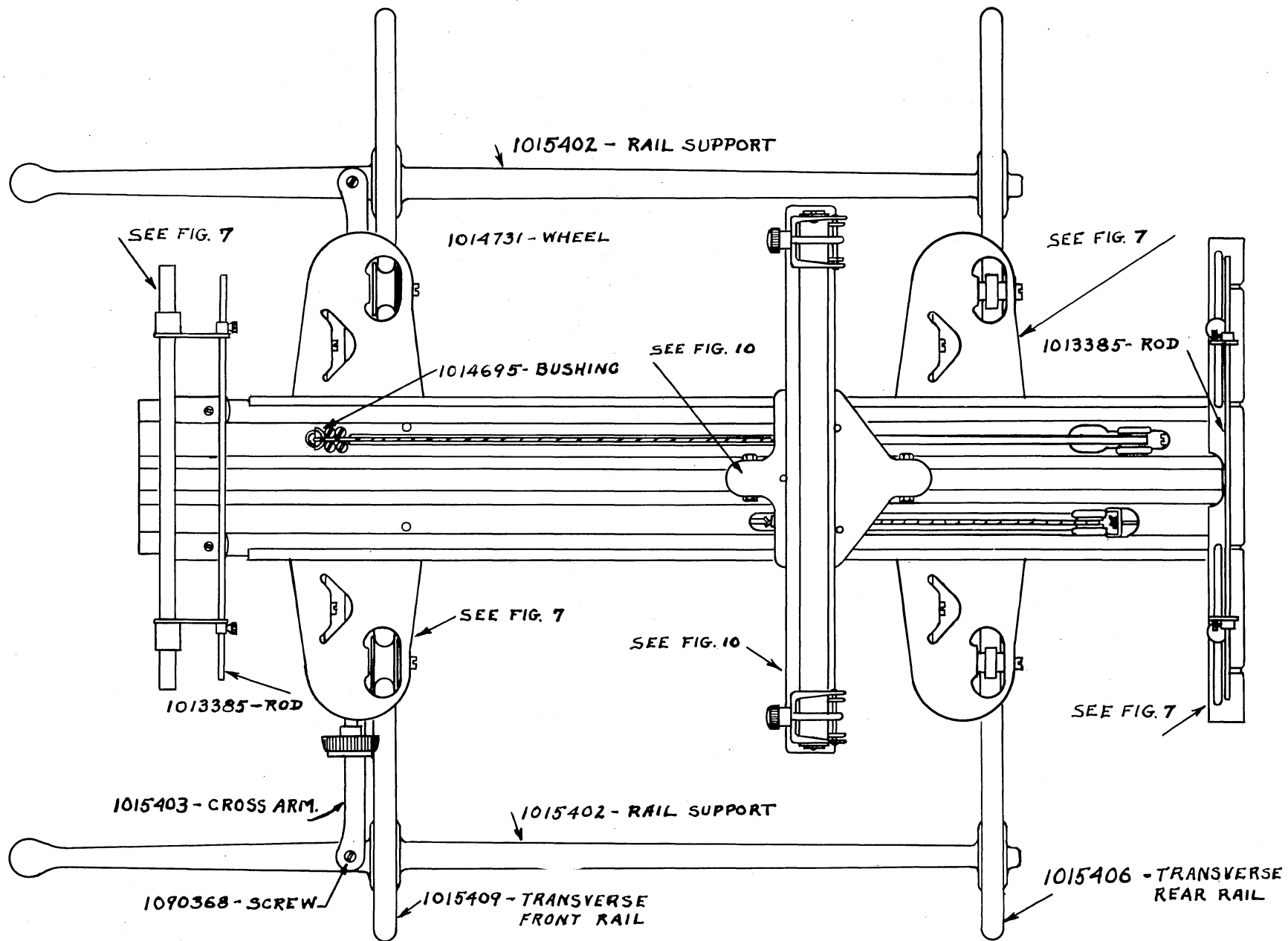
FIG. 6 A



FORMS CARRIER & SUPPORT - FIG. 7

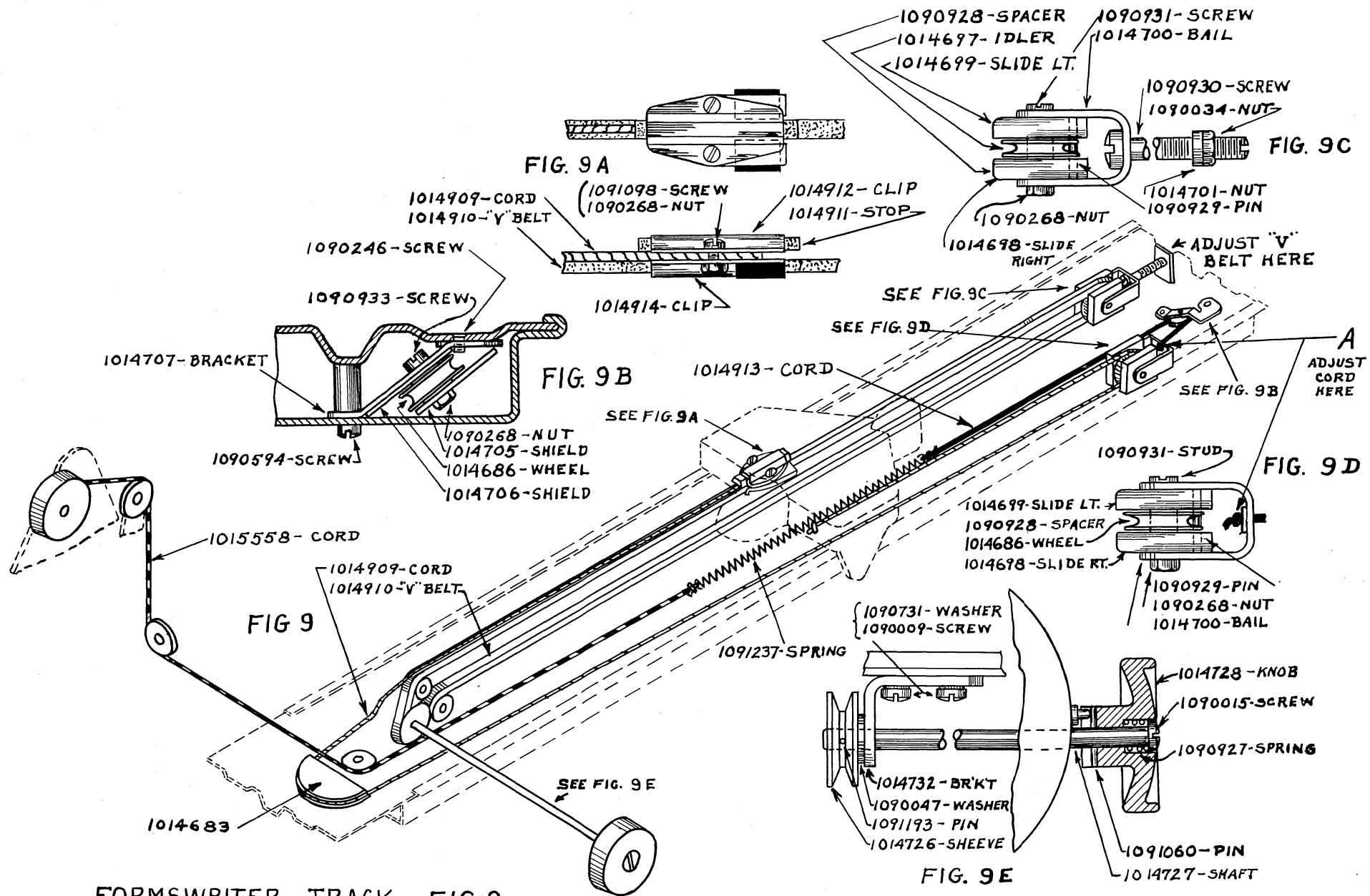
FIG. 7A

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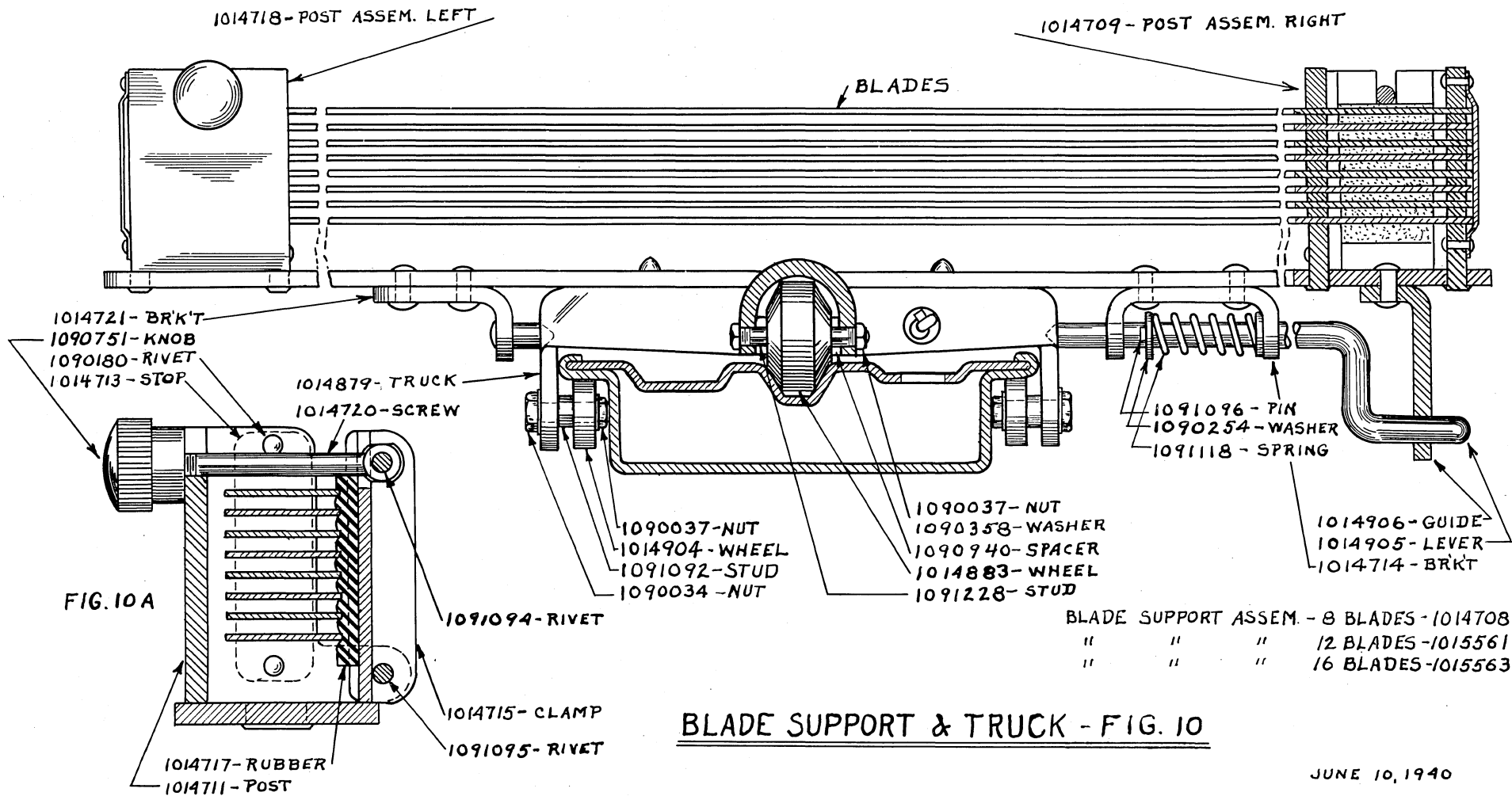


FORMS CARRIER & SUPPORT FIG. 8

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FORMSWRITER TRACK - FIG. 9



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PROPORTIONAL SPACING MACHINE

PROPORTIONAL SPACING - The proportional spacing machine is equipped with three star wheel escapements which can operate separately or in combination. Starting with the rear, the escapement wheels space the carriage two, three, and four units. This makes two, three, four, five, six and seven unit spacing possible by operating two wheels in combination. Two, three, four, and five units are used with the present type design.

With these combinations of carriage spacing a book type of correct design can be used on the proportional spacing machine.

The selection of the star wheels is made through selector bars which are actuated by the cams. The selector bars correspond to the type bars, thus if a type bar is changed to one requiring a different spacing it is necessary only to change the selector bar to provide the correct spacing. In most cases the upper case characters require different spacing than the lower case, which is provided by shifting, with the basket, the bails against which the selectors operate in making the space selection.

UNIT - A unit is $\frac{1}{32}$ of an inch---32 units to the inch. All movement of the carriage must be regarded in terms of units.

TYPE AND TYPE BARS - The type is 12 point in size. A point is $\frac{1}{72}$ of an inch and is a measure of type size. The type is soldered $\frac{1}{32}$ of an inch higher than our other type. The purpose of this is to allow more space between type heads when they are on the rest felt. The type heads are ground as narrow as possible to eliminate colliding. Notice the "M" and "W". In replacing type bars, be sure they are ground to prevent colliding.

The rivets of the 27 and 33 type bars are countersunk to avoid interference. This is necessary because of the narrow segment spacing between slots for these bars.

TYPE SEGMENT - The slots in the type segment are spaced in proportion to the width of the type bars they accommodate.

TYPE BAR REST FELT - The type bar rest felt is thinner than that used on the standard writing machine. The purpose of this is to lower the type heads in the basket, thereby allowing more space. Replace felt with the one designed for this machine only. Rest Felt--#1016347.

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CAMS - Standard cams are used for the Back Spacer
Carriage Return
Shift
Both Space Bars
Tabular

The tabular unlatching cam is a single lobe cam---#1001103

The front letter cams have the long extensions----#1016202

The rear letter cams have the short extensions---#1016205

The cams are adjusted in the usual manner except that when adjusting the letter cams allowance should be made for the weight of the selector. This is done by pressing very lightly on the cam extension when checking cam for adjustment.

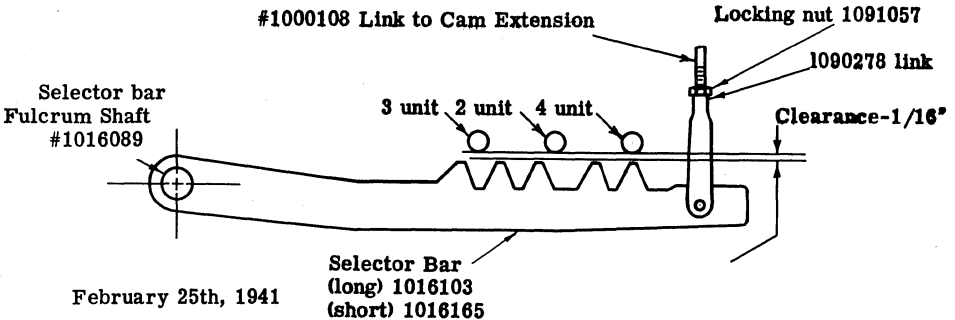
If a new letter cam has been installed make sure the selector bar adjustment is correct. See Selector Bars.

SELECTOR BARS - When a cam is operated, the corresponding selector bar is raised to operate the escapement pawl or combination of escapement pawls through the bails and escapement operating levers. The projections of the selector bars correspond to the required spacing of the type face with which they are working.

If a type is changed to one requiring a different spacing, it is necessary to change the selector bar.

Adjustment - The selector bars must be adjusted to have the proper clearance with the bails. They are to be adjusted to have approximately 1/16" clearance as shown below. The adjustment is made with the #1090278 adjustable link. If there is too much clearance the escapement will fail. If there is not enough clearance the long selector bars will touch the power roll when they are in the raised or operating position.

When adjusting the selectors, make sure the bails are against their stops. If adjusting a number of selectors, wire the bails to the stops or use rubber bands to hold them.



After adjusting the selector bars, check the adjustment by operating the type bars by hand. Hold each bar against the platen. There must be sufficient movement to safely operate the escapement pawl latch. The selector bar must not raise high enough to touch the power roll when the type bar is against the platen.

SELECTOR BAILS - The purpose of the selector bails is to transmit motion from the selector bars to the escapement operating levers. There are three bails. The rear bail operates the three unit escapement, the center bail operates the two unit escapement and the front bail the four unit. The bails by being moveable also provide a means of changing the space selection from one value in the lower case to a different value in the upper case by shifting with the type basket.

There are four positions for the bails:

1. Lower case position ----- normal spacing
2. Upper case position ----- normal spacing
3. Lower case position ----- expanded position
4. Upper case position ----- expanded position

When the bails are actuated by the selector bars, they in turn operate the escapement operating levers which pull down the escapement latches through the connecting link. See drawing on page 4.

Adjustment. The bail assembly must be centrally located on the bail stop brackets. On the left end of the bail assembly shaft are two collars with set screws. These collars are to be so adjusted that the bail assembly will be centrally located.

To properly adjust the bails in relation to the projections of the selector bars, shift the basket to the upper case position and place the expanding control lever in the expanded position. Adjust the #1090278 link attached to the link extending from the shift toggle actuating shaft so that the bails are directly above the projections of the selector bars, see Figure 4 below. Shift the basket to the lower case position and check.

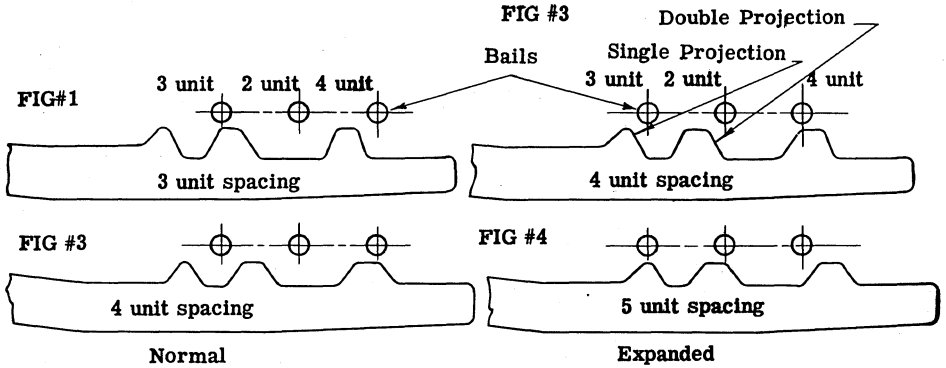
Push the Expanding Control Lever in, which is the normal position, and move the adjustable stop on the key lever spring support plate to the correct position so that the bails are directly above the corresponding projections.

Make sure the correct position has been found for the bails by trying several type bars to see if the correct spacing is obtained.

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SECTION 27

SELECTOR BAILS

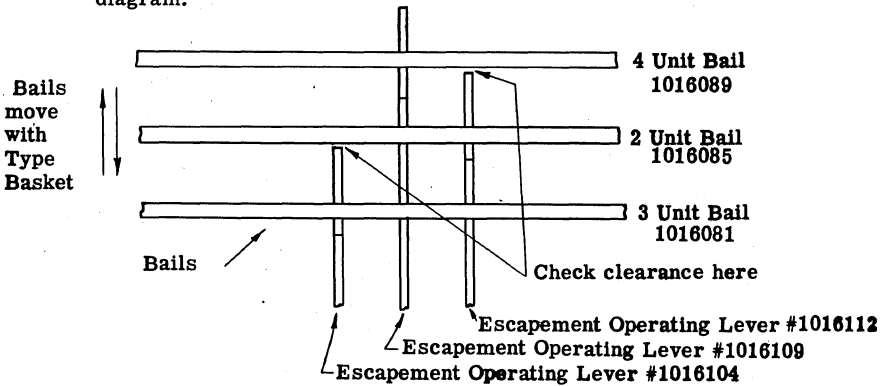


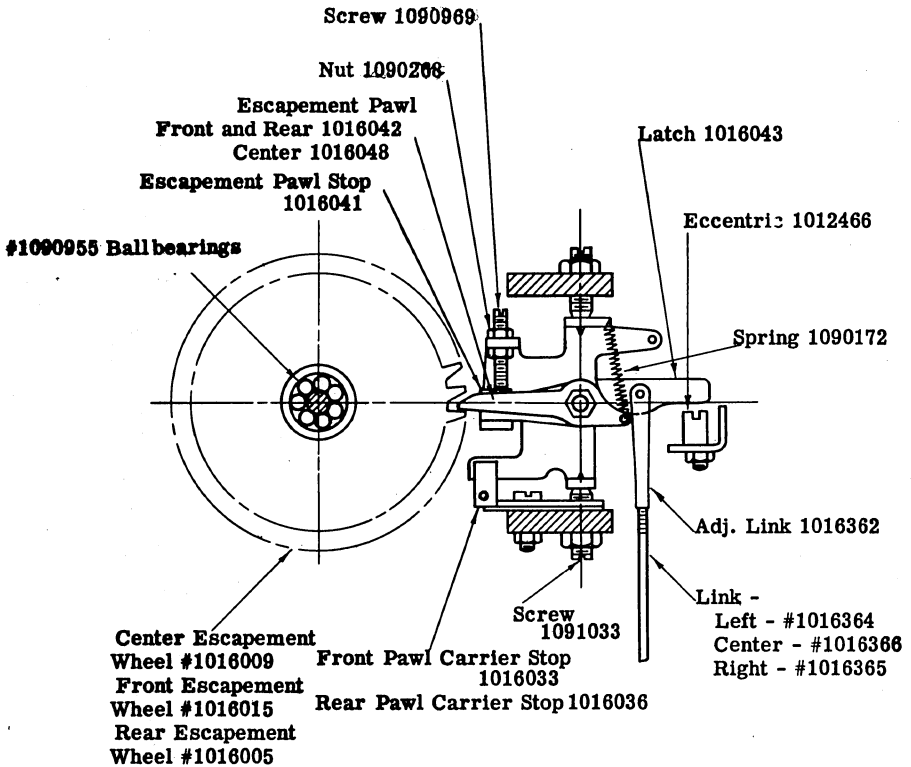
The shaft on which the selector bars are mounted is fastened to the base by two brackets. These brackets are held by screws which pass through elongated holes in the brackets. The brackets are positioned to the rear of the machine as far as possible. This provides an adjustment for moving the selector bars as a group forward or back so that the projections on the left and on the right will touch the bails on the center line.

The position of the selector bails is controlled by the position of the type basket. Any change in the position of the basket will affect the position of the bails which must then be corrected.

If the bails are not properly adjusted, the front bail may interfere with the adjustable links attached to the long selector bars.

Through incorrect adjustment of the bails, it is also possible for the escapement operating levers to interfere with the next forward bail. See diagram.





Center Escapement Pawl Carrier Assembly #1016045
Front & Rear Escapement Pawl Carrier Assembly #1016038

CENTER ESCAPEMENT PAWL CARRIER ASSEMBLY & ESCAPEMENT WHEEL

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SECTION 27

PAGE 6

ESCAPEMENT WHEELS - There are three escapement wheels; the rear wheel for 2 unit spacing, the center wheel for 3 unit spacing, and the front wheel for 4 units. The wheels are mounted on a shaft and turn on ball bearings. These bearings have been packed with grease at the factory and require no further attention.

The adjustment of the escapement wheels has been carefully made and tested at the factory and should not be disturbed.

When oiling the machine, a small amount of oil on the gears mounted on the escapement wheels will reduce the possibility of a bind.

Do not disturb the setting of the lock nuts on the end thrust bearings of the escapement shaft as this adjustment controls the freedom of the escapement wheels. The center escapement wheel has a shadow of side play to assure freedom while turning.

ESCAPEMENT PAWLS AND CARRIER ASSEMBLY - There are three escapement pawl carrier assemblies--one for each escapement wheel. Their purpose is to provide a stop for the escapement wheels and a means of allowing the escapement wheels to turn one tooth at a time for carriage escapement.

The escapement pawl carriers are pivoted on the two pointed screws. Their side motion is limited by two pawl carrier stops.

The escapement pawls, #1016042 and #1016048, must be free from binds.

Removal: The escapement pawl carriers can be removed as an assembly by first disconnecting the springs and links and then backing away the upper cone shaped screws.

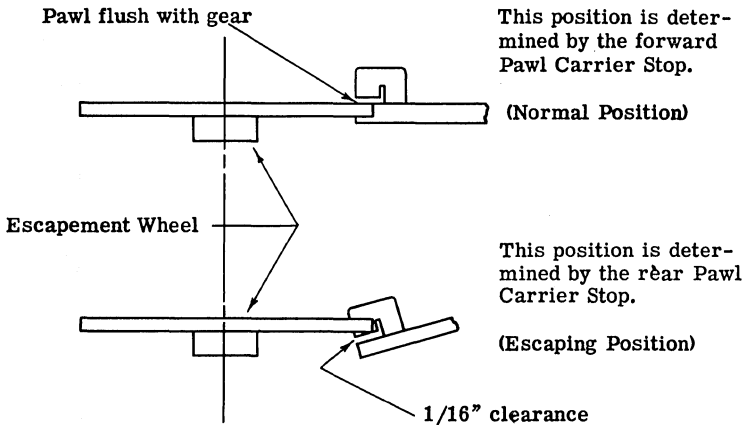
When replacing the carrier, adjust the cone screw so the carrier is perfectly free and has very little end play.

Do not oil the escapement pawls as the oil will cause their action to be sluggish. Put a drop of oil on each of the cone screws.

ESCAPEMENT PAWL CARRIER STOP - There are two carrier stops for each escapement pawl carrier. The forward stop determines the rest position of the escapement pawl. The rear stop limits the motion of the pawl. The position of the two stops is adjustable forward and back and their distance apart is adjustable.

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ESCAPEMENT PAWL CARRIER STOP - Continued - The stops are adjusted by loosening the screws holding them to the casting. The stops should be set so the forward face of the escapement pawl is flush with the forward face of the escapement gear; (Fig. 1) This is determined by the forward stop. The rear stop is to be set so the escapement pawl clears the escapement wheel by $1/16$ of an inch at the end of its travel. (Fig. 2) This stop acts more to prevent excessive motion and must not be set so close as to prevent normal motion of the pawl assembly.



ESCAPEMENT RACK - The escapement rack is attached to the carriage by adjustable screws. The adjusting screws, #1091028, act as adjustable spacers by means of which the escapement rack can be set to have the correct clearance with the escapement pinion.

By correct clearance is meant that there must be sufficient clearance between the rack and pinion so there will not be interference to cause a bind in the carriage and still the clearance must be kept to a minimum to prevent back lash in the gear teeth.

To test for the proper clearance; Move the carriage to the right until stopped by the margin stop. Hold the carriage firmly against the stop with the carriage release lever held down. Test the back lash in the

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ESCAPEMENT RACK - Continued-

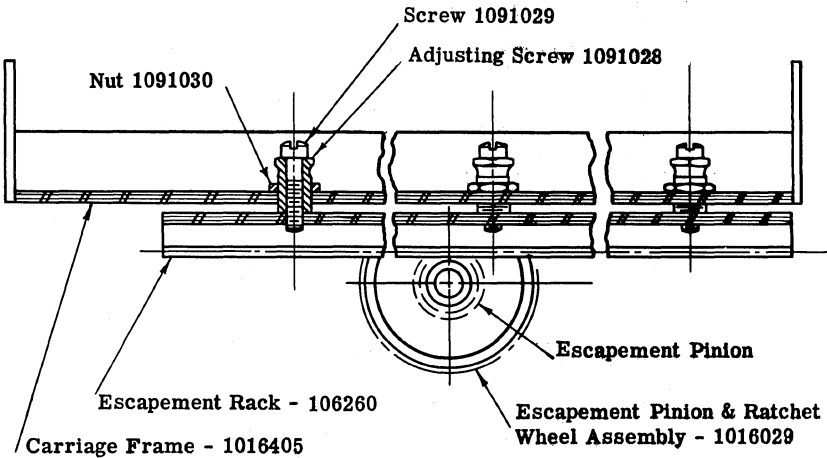
escapement pinion ratchet wheel, #1016029, by trying its movement with a feeler such as a thin screw driver or rod. By unhooking the paper table springs, the escapement pinion ratchet wheel may be reached from the top of the machine just in back of the carriage.

Then move the carriage 1 1/2 to 2 inches to the left, move the margin stop to the right and check for clearance at this position. Test for back lash over the entire carriage length. There must be a slight movement in the escapement pinion ratchet wheel.

To adjust for the proper clearance: First loosen the screws, #1091029, and then loosen the lock nuts, #1091030. Adjust the screws, #1091028, up or down to obtain the proper clearance.

This adjustment must be made carefully. A slight bind here will cause the characters to pile.

To remove or replace the escapement rack, remove the screws, #1091029, and back the adjusting screws, #1091028, until they are flush with the carriage frame.

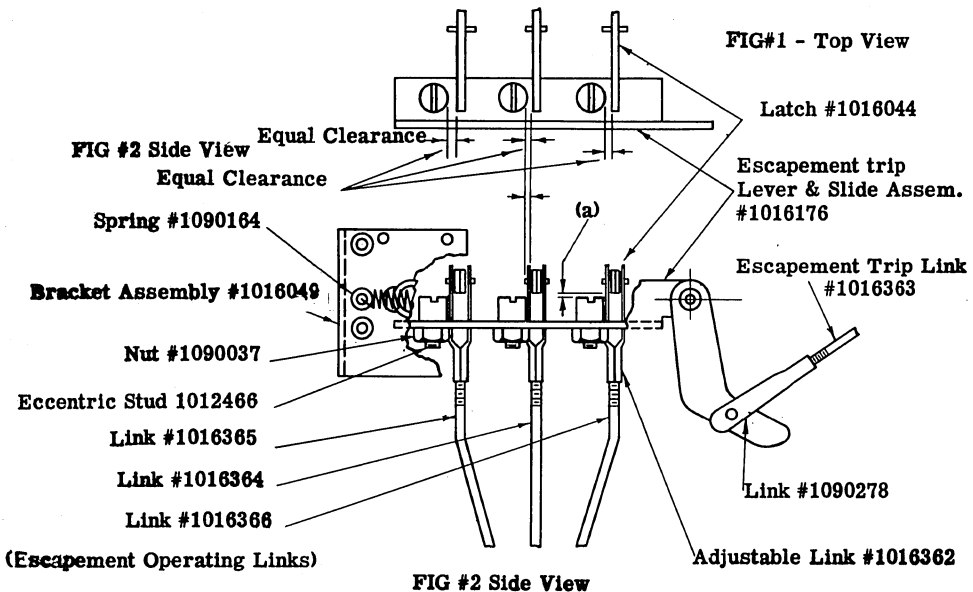


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ESCAPEMENT TRIP SLIDE - The purpose of the escapement trip slide is to operate the escapement pawl carriers. The selection is made by the cam action and carried through the selector bars, balls, escapement operating levers to the escapement operating links which draw down the escapement latches. The actuated latch or latches are then in the path of the eccentric studs, #1012466, as they are brought forward by the escapement trip slide.

Adjustments - Turn the eccentrics so they are towards the escape-ment mechanism. Then adjust them individually, so when looking from the top, there is equal clearance between the studs and the escapement latches. See figure 1. After the clearance has been made equal, the correct clearance is set by the escapement trip link No. 1016363. See figure 2. The clearance here should be adjusted so that with a type bar against the platen the rear face of the pawl will be flush with the rear face of the escapement gear. This will leave approximately 1/16" more movement allowed before hitting the pawl carrier stop. Be sure to check the bars on the ends and center of the basket for correct universal bar adjustments.

The three escapement operating links are adjusted by means of the adjustable link #1016362. These links should be adjusted so that the pawl latches are safely engaged with the eccentric #1012466 when the escapement slide assembly moves forward. There should be a clearance of approximately 1/32" between the bottom of the latch and the top of the eccentric when in a normal position. (a) Figure 2.



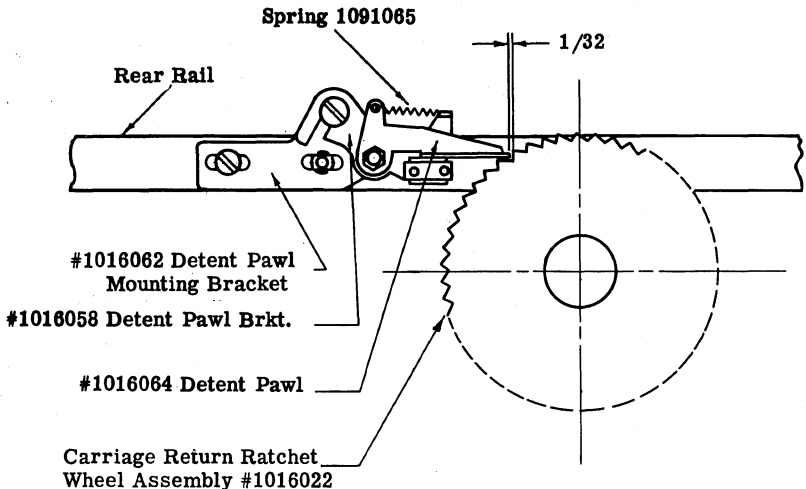
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DETENT PAWL ASSEMBLY - The purpose of the detent pawl is to prevent backward rotation of the escapement mechanism: The carriage return ratchet is allowed to turn in one direction only.

The correct adjustment is that shown in the diagram. The detent pawl should have about $1/32$ of an inch clearance with the teeth of the ratchet wheel. Make this adjustment by moving the mounting bracket in the elongated slots.

Due to an accumulation of tolerances, the pawl will have a different clearance with various teeth of the ratchet wheel. It is therefore necessary to make the adjustment to that tooth which gives the least clearance.

The leather stop should be adjusted so there will be a small clearance between the under side of the pawl and the face of the tooth. This adjustment is made by loosening the nut on the detent pawl and the screw holding the detent pawl bracket.



DETENT PAWL ASSEMBLY #1016367

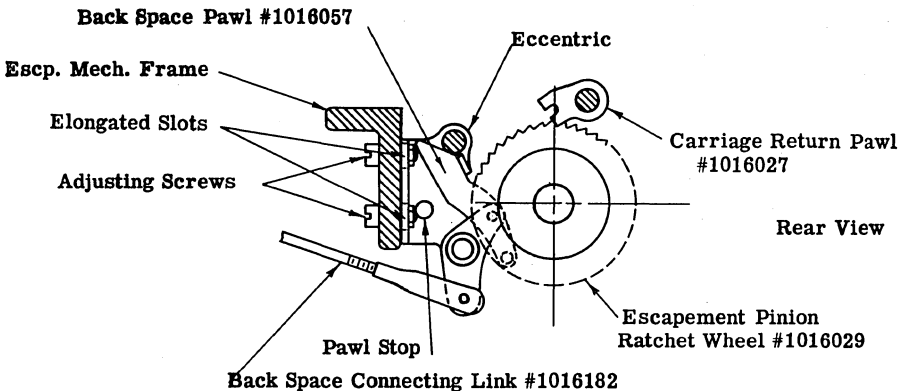
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BACK SPACER - The back spacer moves the carriage to the right one (1) unit. The back space assembly is attached to the escapement frame by two screws. The screws pass through two elongated slots in the back spacer bracket which allows the back spacer to be adjusted up or down.

In operation, the back space pawl, #1016057, moves downward to engage the escapement pinion ratchet wheel which it turns until the pawl, No. 1016057, strikes the pawl stop. The carriage return pawl, No. 1016027, has now engaged the next tooth and holds the carriage in its new position.

There are three adjustments;

1. The eccentric which is set at the factory and should not have to be disturbed. Adjusted for maximum pawl travel.
2. The up and down position of the back space bracket which determines the relation of the back space pawl to the teeth of the escapement pinion ratchet wheel.
3. The adjustment of the back space connecting link.



BACK SPACE ASSEMBLY #1016051

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BACK SPACER ADJUSTMENT - First check the cam for correct power roll clearance.

Operate the escapement by hand until the carriage return pawl, No. 1016027, is in the position shown in the drawing. (At the top of the gear.)

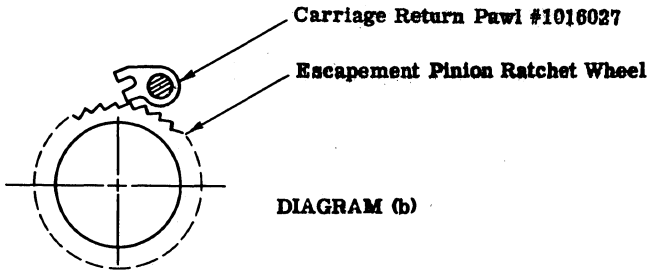
1. Operating the back spacer by hand, hold the pawl, No. 1016057, against the pawl stop. This is the full travel of the back spacer. The carriage return pawl will have dropped into the next tooth and should be in the position shown in the diagram (b), i.e. it should feed one and a half teeth.

This adjustment is obtained by raising or lowering the back space assembly in the elongated slots.

2. Adjust the connecting link so that when the cam has nearly reached its highest point, the back spacer will have completed its travel. Observe this by turning the power roll over by hand and watching the position of the carriage return pawl, No. 1016027.

It will be found easier to make this adjustment on the upper adjustable link rather than the one shown in the diagram.

3. The eccentric determines the entering position of the back space pawl relative to the teeth of the escapement pinion wheel. This should not have to be disturbed.



MARGIN RACK - The margin rack used on the proportional spacing machine is an (8) pitch rack. Since there are 32 units to the inch, there are (4) units to each tooth on the margin rack. For this reason, in setting the left hand margin, it is necessary to make sure the margin stop is in its normal position--after setting the left margin press the carriage to the right to "seat" the margin stop.

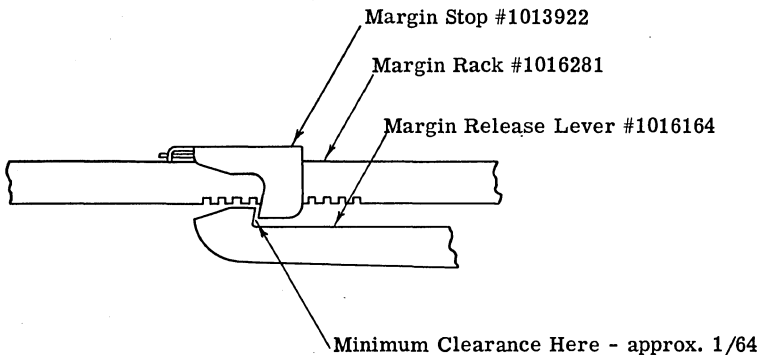
The setting of the margin rack and the tabular rack must correspond so that the carriage can be tabulated and positioned by the carriage return to the same position.

If both the margin rack and the tabular rack are to be set, set the tabular rack first, and then set the margin rack to correspond.

Adjustment of the margin rack: The margin rack must be set so there is as little motion as possible between the margin stop and the margin release lever. (See diagram). The margin rack must also be set to correspond to the tabular rack.

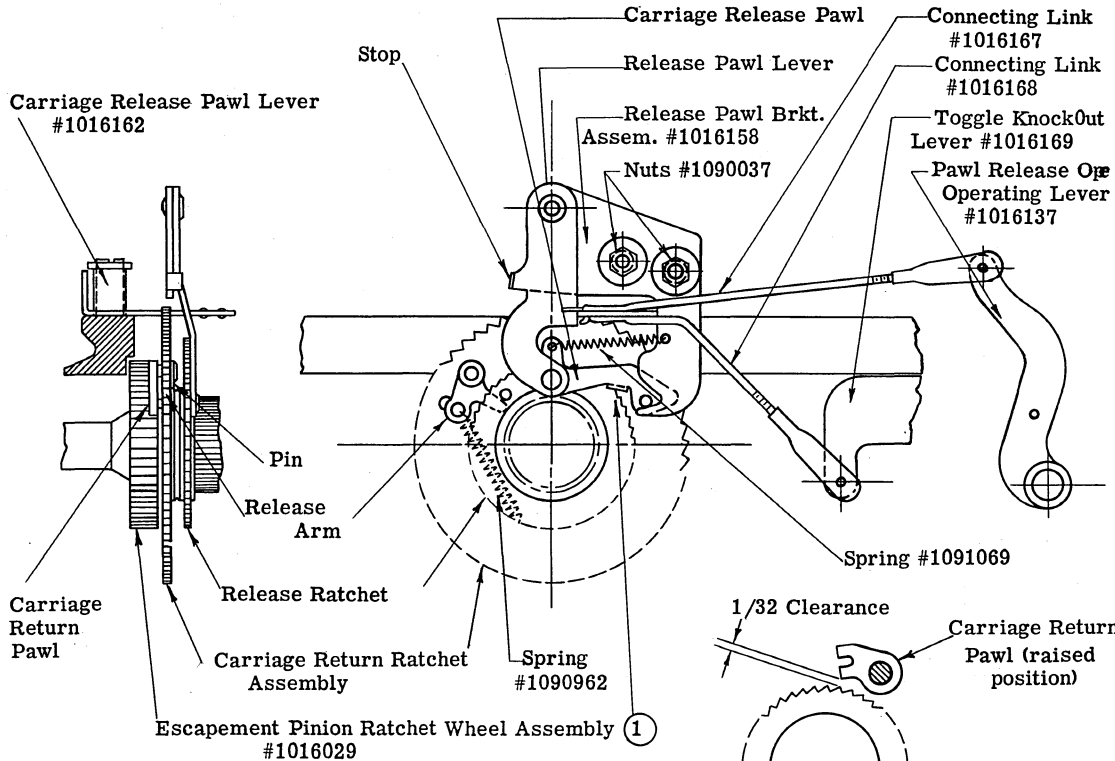
First tabulate the carriage. Then position the margin rack so the margin stop is as close to the margin release lever as possible and still allow for the margin stop to be pressed down or slid into position without interference.

If the margin rack is not properly adjusted, an uneven left margin may result.



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CARRIAGE RETURN PAWL OPERATING MECHANISM

CARRIAGE RETURN PAWL OPERATING MECHANISM - To release the carriage for movement to the left such as tabulating or movement by hand, it is necessary to raise the carriage return pawl. When the carriage return is operated, the carriage return pawl is raised to prevent its dragging on the escapement pinion ratchet wheel. The mechanism for releasing the pawl is shown in the diagram.

The carriage release pawl lever, No. 1016162, can be operated in three ways; by the carriage release levers for moving the carriage by hand, by the toggle knock-out for carriage return, and by the tabular pawl release, No. 1016137.

The release ratchet revolves with the carriage return ratchet assembly. The release ratchet also can move relative to the return ratchet assembly, and it is this relative movement which raises the carriage return pawl. The relative movement is brought about by the carriage release pawl engaging the release ratchet at the position (1).

ADJUSTMENTS - Release Pawl Bracket Assembly: No. 1016158: The release pawl bracket assembly must be adjusted so the carriage release pawl properly engages the release ratchet at the position (1). To watch the pawl engage the ratchet it is necessary to line up the holes in the three escapement wheels by operating the latches of the escapements by hand. The release pawl must be clear of the teeth when in its normal position. When operated it should engage a tooth as shown in the following figure.



To make this adjustment, loosen the two nuts and position the bracket assembly, No. 1016158, until the proper position is found.

Toggle-Knockout Connecting Link-1016168: Adjust the connecting link to such a length that when the toggle knock-out lever is in the raised position, the carriage return pawl will be raised so as to have $1/32$ of an inch clearance with the escapement pinion ratchet wheel. See diagram (b). Too much clearance may be the cause of an uneven left margin. If the link is adjusted too long, the release pawl lever will strike the stop and the toggle knockout will not lock up safely.

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Tabular operated Connecting Link - 1016167: After the tabular mechanism is properly adjusted, adjust the connecting link so the carriage return pawl will be raised $1/32$ of an inch from the escapement pinion ratchet wheel when the tabular operating lever is latched down. If adjusted too long the release pawl lever may again strike the stop.

Operation of Carriage Return Pawl by Carriage Release Levers: Adjust the washers on the ends of the margin rack so the pawl is allowed to come safely out of the escapement pinion wheel when either carriage release lever is pressed down.

If the above three adjustments cannot be obtained correctly, it is because the release pawl bracket assembly has not been correctly positioned.

TOGGLE KNOCK-OUT LEVER - The toggle knock-out lever is adjusted in the same manner on the proportional spacing machine as on the standard machine. It is to have about $1/32$ of an inch clearance with the under side of the margin rack when it is in the raised position.

If the adjustment of the toggle knock-out lever is changed, either raised or lowered, the link connecting from the lower part of the lever to the escapement pawl release must also be changed.

CARRIAGE RETURN CLUTCH AND TAPE - The speed of the carriage return is reduced by using a small diameter pulley especially designed for this machine. The number of the pulley is 1016359. Because of the small pulley diameter, it is necessary to hold the carriage return tape to the pulley with a screw. This makes the carriage return tape special but one can be made from a standard 12" tape by cutting off the end and punching a small hole for the screw.

CARRIAGE TENSION TAPE AND DRUM - The main spring drum is eccentrically shaped for the purpose of keeping constant tension on the carriage during its full travel. A standard main spring is used but wound tighter when putting on the tape to give a heavier carriage tension. The heavier tension is necessary because of the additional escapement parts which must be operated. An old style spring retainer is used since the drum does not have a clearance groove. The carriage tension tape is held to the escapement rack with a screw.

With the tabular lever latched out, it should require 1-1/2 pounds tension, on the spring scale to hold the carriage stationary.

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Clutch Pulley	1016359
Carriage Return Tape	1016361
Screw to fasten	1090011
Carriage Tension Tape	1016337
Screw to fasten	1090011
Main Spring Drum	1016125

CARRIAGE REMOVAL - If the carriage is removed, replace the trucks in the same position as they were. This will prevent disturbing the adjustment of the escapement rack.

To remove the CARRIAGE:

1. Disconnect the tension and return tapes from the carriage.
2. Remove the two screws holding the escapement frame to the front rail.
3. Loosen the screws holding the rear rail. Remove the right hand screw holding the rail to the frame.
4. Remove the carriage trucks.

Rear Rail and Escapement Assembly is removed as a complete Assembly.

1. Disconnect the Toggle Knockout actuating link.
2. Disconnect the Back Space link.
3. Remove the Escapement Trip Link
4. Disconnect the two escapement operating levers. (Space Bars)
5. Remove the ribbon feed assembly and shaft.
6. Disconnect the three escapement operating links.
7. Remove the three tabular links.

Notice that there are .030 shims under the rails.

GOVERNOR - The purpose of the governor is to retard the motion of the carriage during tabulation. The governor is of the centrifugal type, the breaking action increasing as the speed of the carriage tends to increase. The governor requires no adjusting.

The governor is driven from a gear on the escapement pinion through an idle gear (the large gear) which engages a small gear on the governor shaft.

When the carriage is moved to the right, such as return of the carriage, the governor is turned backward and does not set up enough friction to interfere.

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GOVERNOR - Continued.

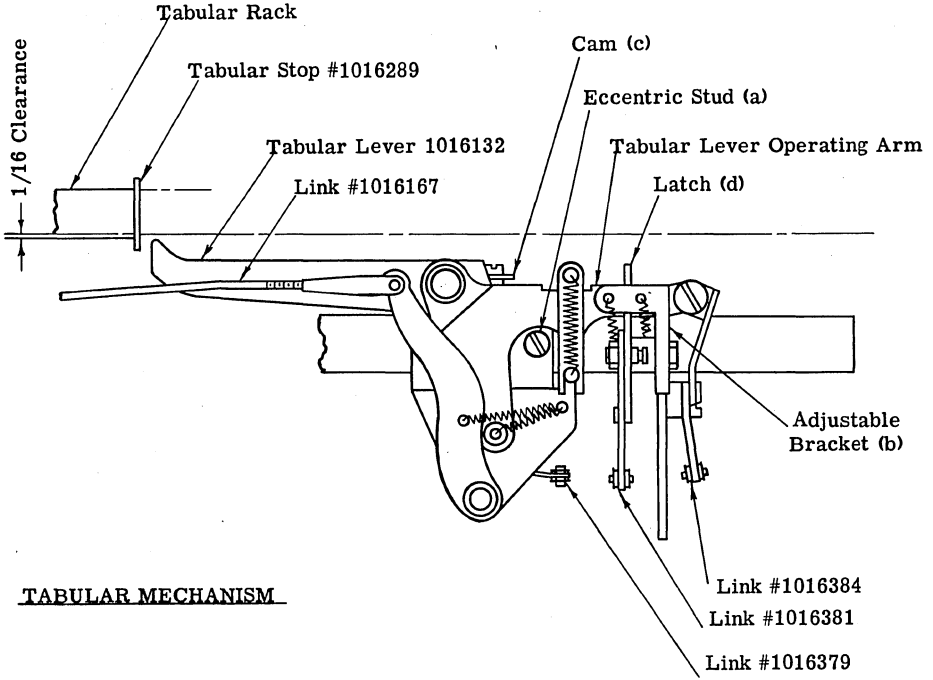
Removal - The governor can be removed by removing the bracket to which the governor and idle gear are mounted. This bracket is mounted on the rear of the power frame by three screws.

The governor case is riveted to the bracket. When replacing for service, replace the governor assembly, the spacers, and the bracket as one complete unit.

Part number for replacement--1016324.

There is a hole in the rear of the base through which a screw driver may be put to adjust the position or remove the governor. The bracket holding the margin bell must first be removed in order to reach the governor bracket screws. Adjust the governor bracket to a position where the idle gear meshes loosely with the driving gear. Be sure there is some back-lash in this gear train so as not to cause a bind.

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TABULAR MECHANISM - The tabular mechanism of the proportional spacing machine operates in an entirely different manner than that of our other machines. There are two cams, one of which raises the tabular lever and releases the escapement and the other releases the tabular lever after tabulation is completed. The cam which operates the tabular lever is a standard single lobe rear cam. The releasing cam is a small single lobe cam. Its contour is such that about one half revolution is necessary before any movement of the cam frame takes place. The purpose of this dwell is to allow time for the carriage to come to rest before engagement of the return pawl.

OPERATION - When the large single lobe cam is released by the key lever, its motion is transmitted to a bell crank located on the tabular bracket. This bell crank raises the tabular lever into the path of the tabular stops. At the same time, link No. 1016167 is operated to release the carriage. The tabular lever and link are held in position by a latch which slides over the lowered end of the tabular lever operating arm.

The carriage moves until stopped by a tabular stop coming against the tabular lever. This moves the tabular lever slightly to the left. This motion is transmitted by a connecting link to a lever which releases the second cam. The second cam operates through a link to release the latch which is holding the tabular lever operating arm down. This restores the tabular to its normal position.

Adjustments: (Disconnect pawl release link No. 1016167)

1. Make the proper adjustment of the large single lobe cam. This is a standard adjustment.
2. Adjust the eccentric (a) on the tabular lever bracket to limit the motion of the tabular lever so it cannot be moved into the teeth of the tabular rack. This eccentric is an overthrow stop and normally the tabular lever does not touch it.
3. The tabular lever must be adjusted to have the proper engagement with the tabular stop. The proper adjustment is shown in the drawing. Make this adjustment by moving up or down the bracket (b) to which the latch is fastened which holds the tabular lever operating arm down. There should be about 1/16 of an inch clearance between the tabular lever and the rack.
4. The tabular latch link, No. 1016384, must be so adjusted that it will operate the tabular so the latch will safely engage the tabular lever operating arm. Turn the power roll over by hand to check this. The tabular lever operating arm should go slightly below the latch as a safety factor and then come up against it.

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5. The tabular operating connecting link, No. 1016167, is the next adjustment. This is described on Page 16 and illustrated on Page 14.
6. When the tabular moves to the left, it engages a cam (c) which is fastened to a shaft. At the lower end of this shaft is a lever to which is fastened the unlatching trip link, No. 1016379. The purpose of this link is to release the small single lobe cam by the movement of the tabular lever. This link is fastened to the long release lever.

Adjust this link so the small cam is released before the tabular lever reaches its full travel. With the power turned on, move the tabular lever back and forth by hand to test for a safe adjustment. This link must have no interference with adjoining parts.

7. Next adjust the unlatching link, No. 1016381, which is operated by the small cam and which unlatches the tabular lever. Trip the small cam and turn the power roll over by hand. The link should be so adjusted that the latch will be drawn from the tabular lever and a safe distance from it before returning to a normal position.

If this link is adjusted too short, it will not allow the latch to come safely over the tabular operating arm.

8. The cam described under (6) is held against the tabular lever by a coil spring which is around the lower part of the cam shaft under the bracket. This spring is adjustable and should be so set that the cam will return freely to its normal position against the tabular lever but there should not be too much tension. Too much tension on a short tabulation might keep the tabular lever from moving far enough to operate the release cam. It should not be necessary to change this spring tension.
9. Tabular Rack - The tabular rack and the margin rack must correspond since one position on each represents four units. The easier way is to first adjust the tabular rack - tabulate - and position the margin rack with the stop against the release lever. (See Margin Rack).

If the margin rack is set and it is desired to set the tabular rack, this is done by trial and error. Set the tabular rack where you think it should be - tabulate - and then see if the margin stop can be slid into its correct position against the margin release lever.

If this position is not correct, move the tabular rack - it can lack but one unit of being correctly set relative to one of two tabular stops.

After the tabular rack is correctly set on the right unit so that the tabular and margin racks correspond, it must then be set correctly to that unit of space. To do this first operate the escapements by hand until the carriage return pawl No. 1016027 is at the top. Then with the power off, press the tabular operating lever down and allow the carriage to be held by the tabular lever. Then watch the carriage return pawl No. 1016027 and trip the tabular latch (d) and notice what part of the tooth the pawl No. 1016027 engages. Adjust the rack so that the pawl will engage the tooth far enough back to always drop safely into the same tooth. This could be the cause of uneven tabulation.

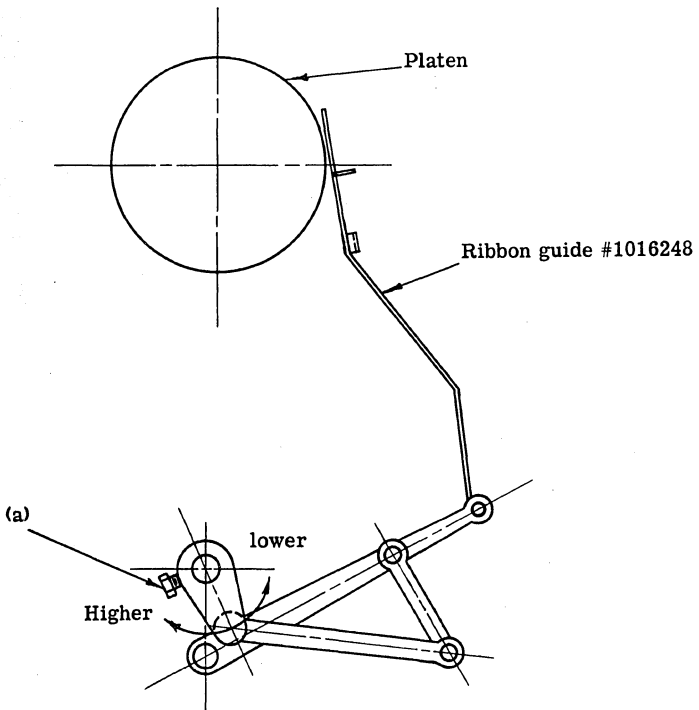
10. Try the tabular operation with power. If the tabular is operated until the carriage comes to the end plate and the tabular button is touched twice, two tabulations will be stored and the carriage will tabulate after carriage return. This is a normal condition.

RIBBON FEED MECHANISM AND RIBBONS - The ribbon feed mechanism is designed to use carbon paper ribbon as this is most suitable for the purpose for which the PS machine has been designed. The feed mechanism operates from the escapement mechanism so that the ribbon is proportionally spaced which results in maximum saving of ribbon and still assures that each character will strike a fresh piece of ribbon.

The mechanism requires no adjusting other than being free from binds. A bind in the ribbon feed will cause faulty spacing of the carriage.

RIBBON LIFT MECHANISM - The proportional spacing machine does not have a ribbon lift control rod as the ribbon is narrow and feeds through but once. The need for a stencil position is eliminated by merely breaking the tape when it is not needed. This is the main difference between the lift mechanism on the P.S. machine and the standard writing machine.

The ribbon must raise to the correct height to assure proper printing and prevent the ribbon from breaking. This adjustment is shown in the diagram.



To cause the ribbon to throw higher, loosen the hexagonal screw (a) and move the arm back. To lower the ribbon move the arm forward.

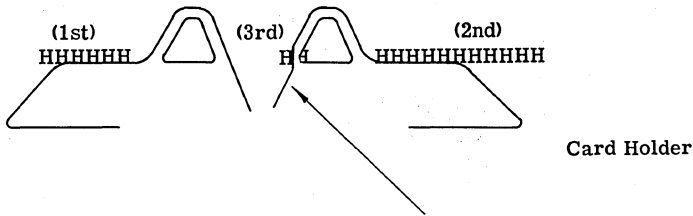
February 25, 1941

SPACE BARS - The machine is equipped with two space bars one of which moves the carriage two units and the other three units.

There are links connecting the space bar bell cranks with the escapement operating levers which provide an adjustment. These links are to be so adjusted that the levers which operate the escapement assemblies should have approximately 1/8 inch clearance with the escapement latch, No. 1016043. To check this adjustment, trip the space bars, one at a time, and see that the escapement assemblies are safely operated.

MARGIN RELEASE - When the margin release lever is in the normal position, there should be a small clearance (.010" to .015") between the margin release lever and the margin rack. There is an adjustable eccentric screw mounted on the tabular bracket which acts as a rest stop for the margin release lever. Adjust this screw to obtain the clearance described above.

CARD HOLDER - The card holder has a double purpose. Aside from the customary purpose it is used as a means of repositioning the carriage (See Operator's Instructions). To set the card holder to act as a guide, type a series of Capital 'H's'. Space the carriage twenty to thirty units and type another series of 'H's'. Move the carriage back and type two 'H's'. Then back space the carriage (16) units and position the card holder so that the straight line or positioner is placed accurately between the two 'H's'. See the diagram below.



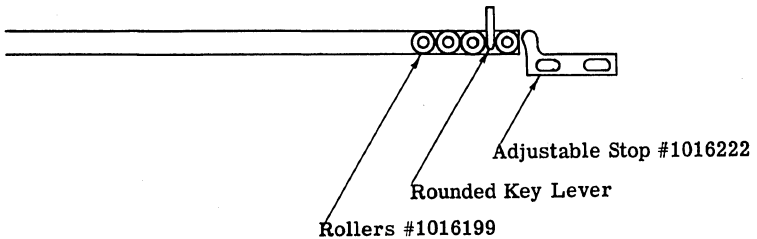
KEY BOARD INTERLOCK - The key board is equipped with an interlock, the purpose of which is to protect the type from collision. Since but one key can be operated at a time, collision of bars is eliminated and the danger of the machine becoming jammed due to careless operation is reduced.

The interlock consists of one less roller than there are character keys - the rollers being contained in a channel bar under the front end of the key levers. The spacing of the rollers is so adjusted that there is space between any two at one time for a key lever. Thus when a key lever is depressed, the space is entirely filled and another key cannot be pressed until the first is released.

The ends of the key levers are rounded to aid in spreading the rollers. Only special key levers can be used for replacement.

The correct adjustment is made by positioning the stops so only one key can be pressed down at a time and so that the key will be free to return.

DO NOT OIL THE INTERLOCKS - THIS WILL CAUSE THE ROLLERS TO STICK IN THE GUIDE;



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PLATENS - The platens used in the proportional spacing machines are of a special rubber and have been carefully selected to give the best results. The quality of the printed work is dependent to a large extent on having the correct platen.

A soft platen will cause the characters to be fuzzy and heavy. A soft platen will also cause the lower case characters to be overemphasized. A hard platen will cause the reverse condition.

To obtain the best results from a platen do not use a backing sheet. A backing sheet will result in the characters lacking sharpness.

The platens to be used in the proportional spacing machines are marked (8). (The first few machines built had either a hard #1 or a #2 platen).

MOTOR, CONDENSER and RESISTOR - It is necessary to use a General Electric motor because the casting of the latest Westinghouse interferes with the bail support bracket.

The resistor and condenser is special in that the leads must be longer since the assembly is positioned farther from the terminal block.

RIBBONS - The carbon paper ribbon is $\frac{9}{32}$ of an inch wide and approximately 400 feet long. Four inches is the largest outside spool diameter which the ribbon container will accommodate. The inside spool diameter must be at least $\frac{11}{16}$ of an inch.

February 25th, 1941

TOLL BILLER

The Toll Biller is different from the standard machine in the following features:

1. May have narrow platen with "straight feeding" features for billing form. Is equipped with paper chute.
2. Special "cut out" locking bar as some keys are in "down" position when at rest.
3. No shift mechanism.
4. #10,000 series tabular rack and lever used. Carriage moves one space beyond tabular lever as compared with two spaces on standard machine. Tabular cam is double lobe for faster tabular action.
5. Carriage return may be on left or right. If on left, is operated from the right side by a universal bar. Tabular lever may be on either side.
6. If a full length platen is used the machine has a 9" writing line.
7. May be equipped with a line counter.
8. Automatic features.

OPERATION OF AUTOMATIC FEATURE

The keyboard and type arrangement may vary but the principle of operation remains the same.

Refer to the drawing. Assume that the character "20" has been pressed. This releases #40 cam which will print (2). As the cam operates, the cam frame operating through the link, raises the "0" transverse bar at the right and lowers it at the left. Lowering the "0" bar at the left releases the single lobe cam through key lever #00. This causes the "0" to print. This cam is single lobe for correct timing purposes.

The "0" transverse bar has been raised at the right against the forked member of #43 key lever and as it starts to fall back into its position, cam #43 is released, which operates the carriage return key lever through the cam frame, link 1017240 and 1017241.

This completes the automatic cycle.

June 11, 1941

SEQUENCE OF OPERATION

1. Double printing numeral key is pressed.
2. Cam operates - cam frame having extension.
3. Transverse bar is raised.
4. Second cam (on left) is operated.
5. As pivot bar is lowered, intermediate cam is released which operates the carriage return.

ADJUSTMENT OF AUTOMATIC FEATURE

1. Check the adjustment of all cams (standard cam adjustment).
2. Links on the right end of "0" and "5" transverse bars must be adjusted to raise the #43 key lever to safely trip the intermediate cam #43. With the power off, turn the motor coupling until the cam is at its high point then hold the type bar against the platen. The #43 key lever should be approximately 1/64" from the top of the key lever guide comb.

Adjust all links on the right in this manner.

3. With type bars which operate the "0" and "5" transverse bars held against the platen (same as above) adjust the links on the left to lower #0 and #00 key levers to approximately 1/64" from the bottom of the guide comb. This will safely release the cams to operate #00 and #0 type bars.
4. Release any double printing number key and turn the motor coupling until the intermediate cam #43 is at its high point. Adjust either link #1017240 or 1017241 so the right hand carriage return key is lowered to within 1/64" of the bottom of the guide comb.

A different keyboard arrangement may require a different arrangement of links between the cam frame extensions and transverse bars, but adjustments are the same.

Notice that there are two holes in the cam frames for the links to the transverse bars. Links to the rear transverse bar are placed in the rear holes. Links to the front bar are placed in the front holes.

June 11, 1941

0
#00

1
38

1
42

5
#0

PN
36

2
40

2
44

TYPE ARRANGEMENT

Bell Crank Assem. 1017236

Connecting Link 1000223

1017211 "00" Key Lever

1017212 "0" Key Lever

#43

Spring 1091278

Cam Unit
1017230

Bracket 1017238

#43 Key Lever

To Cam 1017228

To Cam 1017229

1017214

Connecting Link
1017241

#43

To #43 Cam

Link #1017240

Pivot

1017242

Letter Cam Unit 1017225

Transverse Bar
1017239

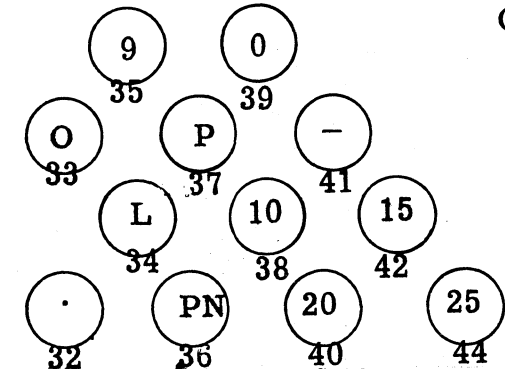
Spacer 1017244

Car. Ret. Bell Crank 1017245

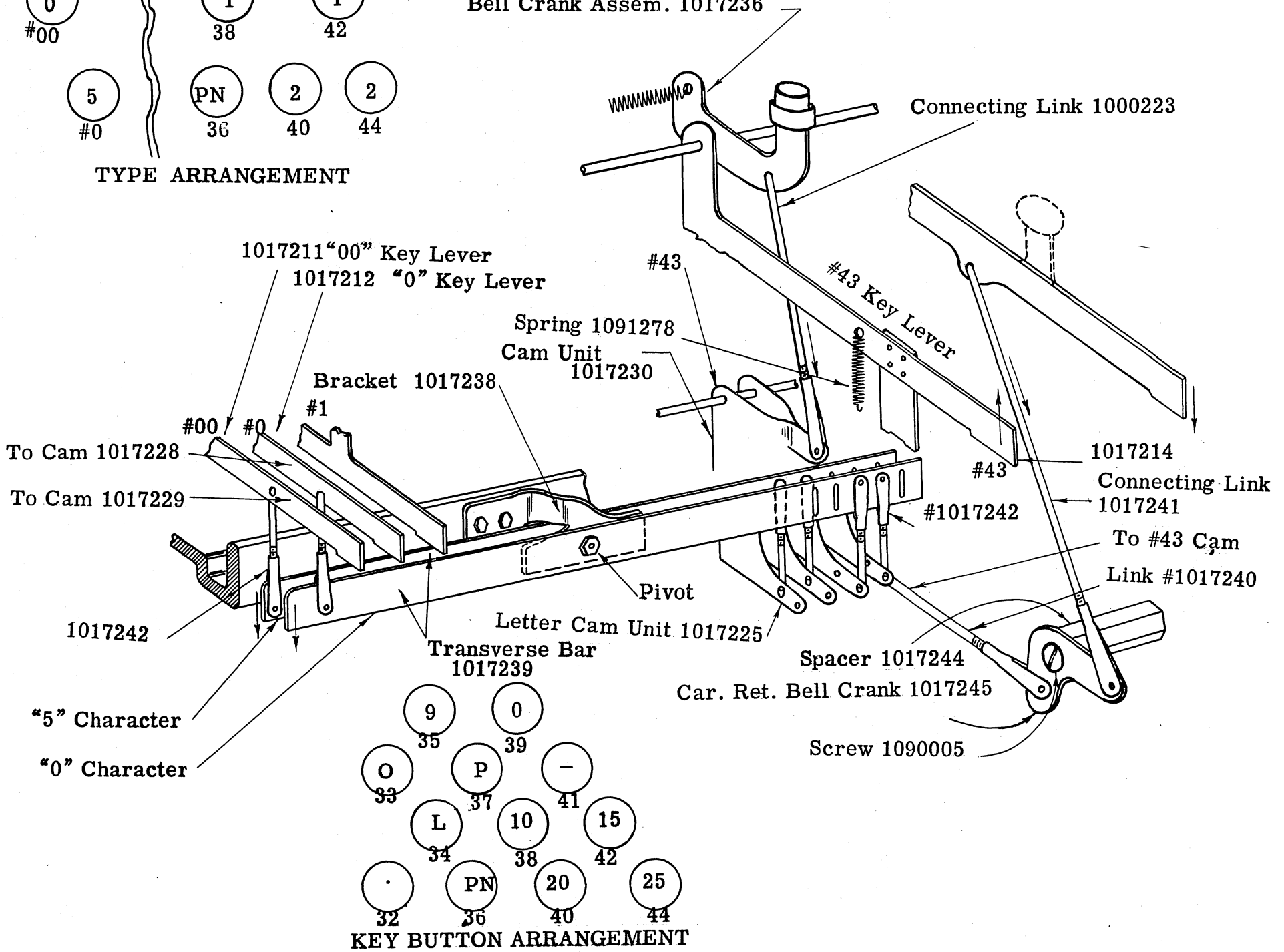
"5" Character

"0" Character

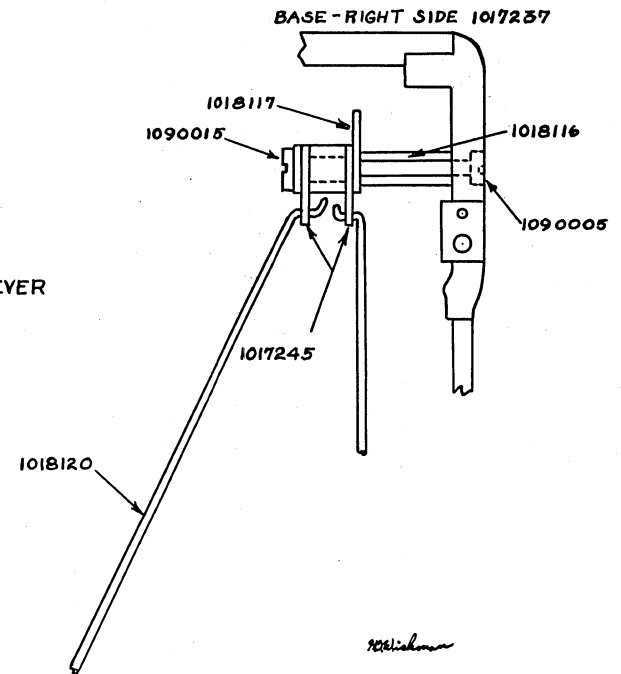
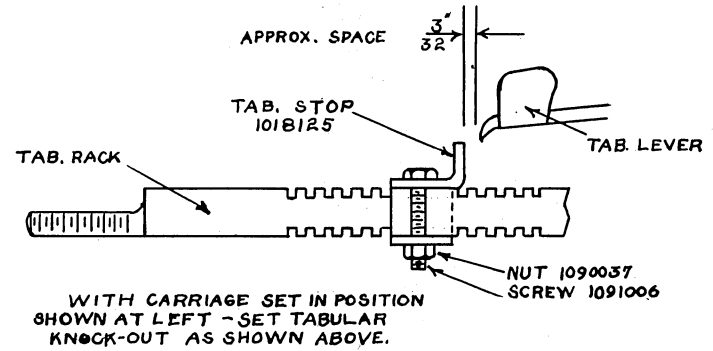
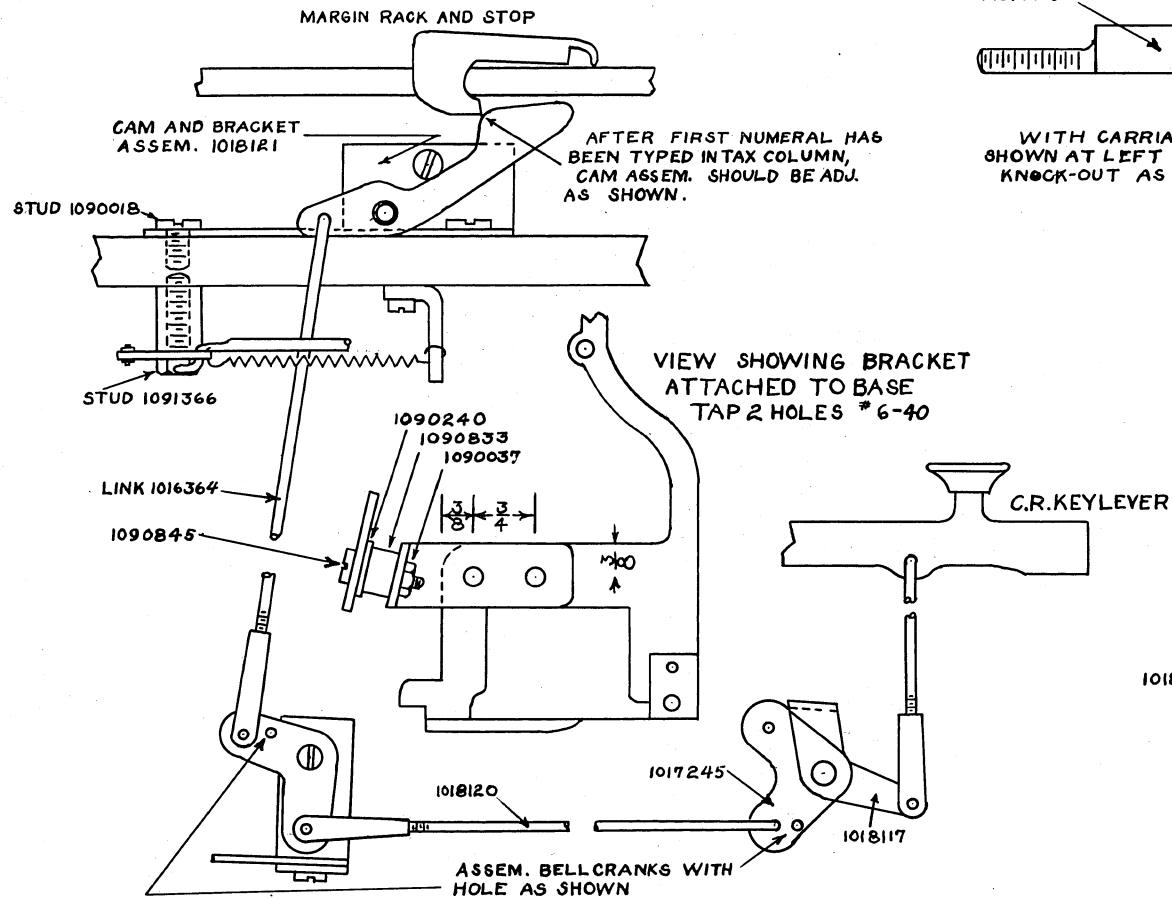
Screw 1090005



KEY BUTTON ARRANGEMENT



TOLL BILLER AUTOMATIC CARRIAGE RETURN
ATTACHMENT NO. 1018115



January 15, 1942

The paper feed on the Toll Biller is different from the standard machine and is so designed as to automatically align and straighten forms. This is accomplished by having the front feed roll exert all of the pressure on the form and adjusting the rear roll to merely touch the paper and act as a guide in feeding the form to the front rolls upon initial insertion.

The center rolls of the rear feed roll assembly are grooved and undersized to allow light pressure on the form. The rotating power comes from the outside rolls which are in contact with the platen.

The rear rollers should be light enough to allow the form to slip sideways for purpose of correcting a crooked feed.

The forms chute should be adjusted to give a minimum clearance with the form. It should also be positioned to center the forms with the center of the front feed roll. This will prevent side slippage.

If trouble is encountered with forms feeding crooked, check the deflector for side shift by holding it in one hand and rotating the platen with the other hand. If the platen moves to the left or right make corrections by twisting the deflector. Check the rear feed roll for proper clearance. It should grip the form as lightly as possible. It may be necessary to reduce the diameter of the center rollers. This can be done by holding a strip of sandpaper or emery cloth, slightly wider than the form, with the abrasive side toward the feed rolls and rotate the platen until the desired result is accomplished.

June 11, 1941

PACK HOLDER

DATA:

#1015675 USED ON 12" Carriages, 9 inch writing line, for forms 4-3/4 to 10 inches wide and up to 11 inches long.

#1015825 Used on 16" Carriages, 13 inch writing line, for forms 4-3/4 to 14 inches wide and up to 11 inches long.

WHEN ORDERING:- Forms Pack Holders for installation on machines now in the field, check Tabular Rack to see if the right hand end of the rack is drilled so the Final Stop Pin can be transferred to the inside hole. It is necessary to use 9" writing line Tab Rack Assembly (same as used on Lift Platen Machines) to avoid interference. In case the Tab Rack on the machine is not drilled for a 9 inch writing line, it will be necessary to order the proper Tab Rack Assembly with the Forms Pack Holder.

On later style machines the Tab Rack Assemblies are coming through with the extra hole drilled and to avoid delay it might be easier to transfer a late style rack to the machine which you are equipping with the Forms Pack Holder. In the event the Forms Pack Holder is being installed in a machine made before we went to the 10" writing line the Tab Rack will not have to be altered.

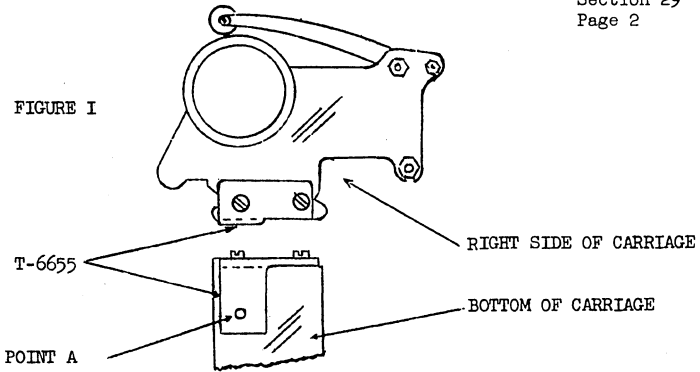
The same procedure is necessary on a 16" machine.

INSTALLATION:-

1. Remove platen and deflector
2. Set machine on its back and pull carriage to extreme right.

November 29, 1939

FIGURE I



3. Remove final stop #1002526 from right side of carriage, place template T-6655 as shown in Figure 1, drill (#29) and tap (#8-32) hole at point "A" for #1090018 final stop screw.

4. Set machine back on feet and remove the following:

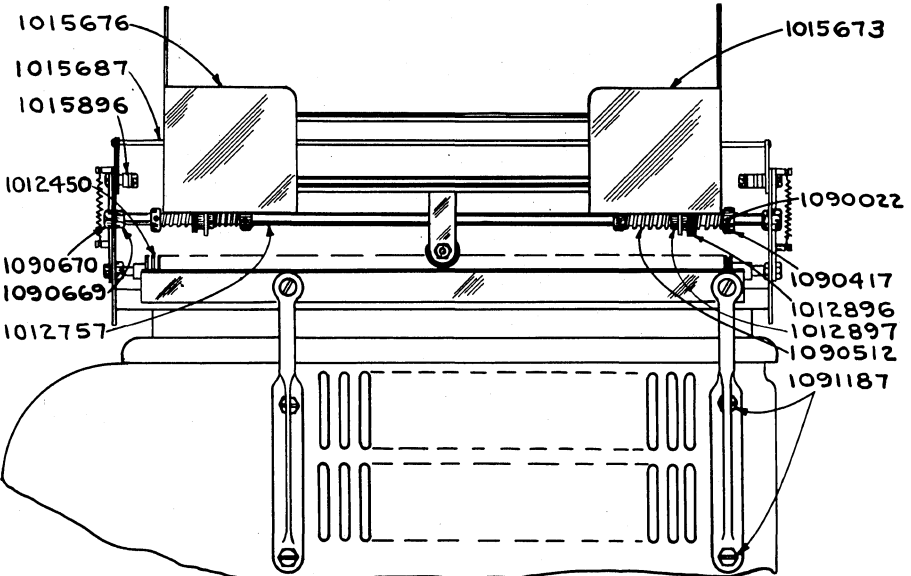
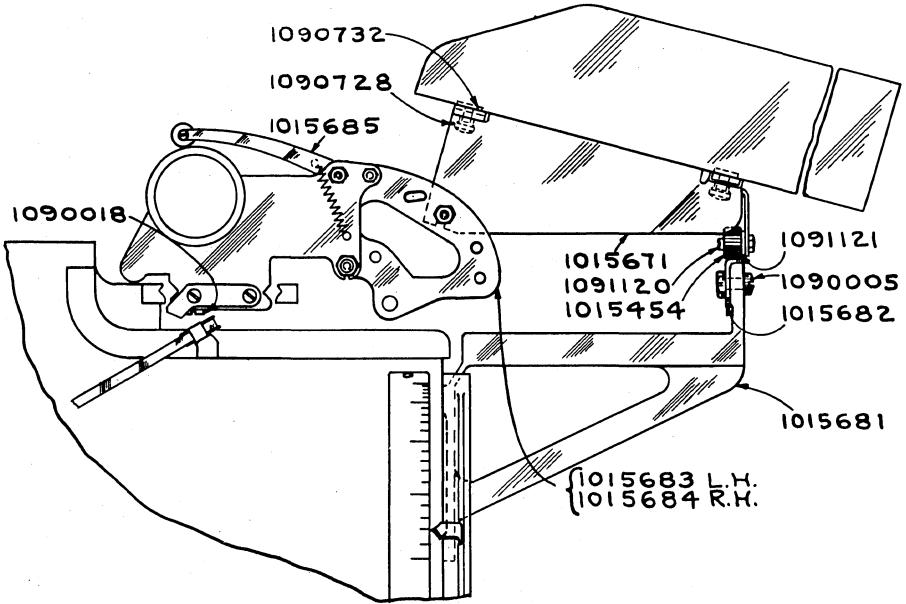
- a. Bail levers assembly
- b. #1090020 Spacer (between carriage L.H. end plate and bail levers)
- c. #1000418 R. H. Paper Table Spacer
- d. Tabular rack (this will be installed at "C" below if it is for a 9 or 13 inch writing line)
- e. Carriage tie rod #1000316 - 12" carriage or #1002518 - 16" carriage.

5. Install the following: -

- a. #1015683 L. H. Extension plate (replaces #1090020 spacer)
- b. #1015684 R. H. " " (these plates are flush against carriage end plates.)
- c. #1012524 tab rack 12" - or #1012835 tabular rack 16"
- d. #1015685 Bail Levers 12" or #1015815 Bail Levers 16"
- e. #1015896 Spacer R. H. (this replaces #1000418)
- f. Replace standard tie rod.

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- g. #1012757 tie rod with the bushings and springs on.
6. Remove 4 screws that hold rear base plate to machine and mount #1015681 third rail brackets (see drawing)
 7. For installing the remaining parts (see drawing)



QUESTIONS AND ANSWERS

Switch.

- Q. What is the cause if the switch should fail to operate?
- A. 1. May be caused by broken coil spring in switch; replace switch assembly.
 2. May be caused by loose screws which hold insulation pieces together.

Motor

- Q. If the motor should stop or fail to start what can be the cause?
- A. 1. Governor collector ring dirty.
 2. Governor brushes stuck in holder.
 3. Governor or armature brushes worn.
 4. Motor bearing set up due to lack of oil.
 5. Defective wiring. Check all connections.
- Q. If motor speed does not respond to the impression indicator, what is the cause?
- A. Defective governor points. Replace governor assembly.
- Q. If the typing impression should vary what should be the reason?
- A. 1. Motor bearings setting up due to lack of oil.
 2. Defective governor points. Replace governor assembly.
 Check line voltage to make sure machine is installed on correct current - AC or DC.

Key Levers and Cams

- Q. If a key is pressed without operating the type bar, what can be the cause?
- A. Cam sticking (See Cam Units - Service)
- Q. If a character repeats when operated, how can this be corrected?
- A. May be caused by a bent cam release lever or arm over which the fork of key lever operates. May be caused by cam being adjusted too close to power roll. Inspect the cam and check adjustment.
- Q. If key lever operates hard what is the cause?
- A. The cam release lever needs to be oiled at the point of operation in the key lever slot.

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Type Bars

- Q. What is the cause if the type bar rebounds?
- A. Type bar felt pad worn - should be replaced or built up.
- Q. If type bars collide what should be the cause?
- A. Rebounding of bars causes colliding.
- Q. If the cam operates when a key is pressed but the bar does not print, what should be the cause?
- A. 1. Dirty type segment slot or a burr on the side of an adjacent type head.
2. The link connecting the type bar and the bell crank may be out of place.

Alignment

- Q. If a character prints light and dark alternately what can be the cause?
- A. This is caused by an imperfect cam unit which should be replaced and correctly adjusted.
- Q. If a character prints too hard how can this be corrected?
- A. Replace the type bar spring with a heavier spring 1090161.
- Q. If a character is cut out when writing a stencil how can this be corrected?
- A. This can be caused by the bar striking either too hard on the ring or on the cylinder. (See Alignment to correct this condition.)
- Q. If a shadow appears over or under a character what is the cause?
- A. See (Aligning - Overprinting and Underprinting)

Type Piling

- Q. What is to be corrected if the type piles?
- A. 1. There may be a bind in the carriage movement resulting from a bind in the spring drum or resulting from dirt in the carriage rails.
2. The escapement trip link may not be properly adjusted (see Escapement)
3. A few coils may need to be removed from the spring 1090341 connecting the universal to the escapement trip lever 1000265.

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Type Piling (continued)

4. Check the carriage tension.

Tabular

- Q. If the tab lever goes one space beyond the tab stop instead of two spaces how is this to be corrected?
- A. 1. Check for a bind in the tab lever.
2. Check the bite of the end of the tab lever on the tab stops. It may be necessary to replace the tabular latch 1000236 with a shorter one.
3. Test the carriage tension and the tension of the spring 1090626 on the rebound check lever. Too heavy a tension on the spring 1090626 may cause this trouble.

Tabular Friction Governor

- Q. What is the cause if, when the tabular is operated, the carriage moves slowly and then stops before reaching the end of the tabulation?
- A. The friction governor is set too tightly. Loosen the two nuts 1090453. (See Tabular Friction Governor)
- Q. When operating the tabular, if a rasping noise comes from the rear of the machine what is to be corrected?
- A. Lengthen the adjusting link operating the friction governor pawl a turn or so until it catches on the teeth of plate 1000711 when the tabular is operated.

Back Spacer

- Q. If the back spacer moves the carriage two spaces what is to be corrected?
- A. This condition results from too much play in the back spacer linkage. (See Back Space Mechanism - Adj. 5.) If this does not correct trouble, check adjustments as outlined.
- Q. If the interlock arm is forced and locks near the bracket on the rear rail how can this be corrected?
- A. Check the adjustment of the back space pawl stop 1000565 under the rear rail (See Back Space Mechanism)

Note: A little oil on the back space pawl will cause it to operate and relocate better.

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Type Basket Shift

- Q. If the type basket fails to remain against the stops when shifted - bounds back or does not shift quite to the stop, what is to be looked for?

- A. Oil the shift toggle joints as this may be caused by a bind. Inspect the shift hairpin springs 1000125 and 1000125 for sufficient tension and for not interfering. Check the clearance of the shift head (T lever) behind the pins on shift latch lever 1001414.

Carriage Return Mechanism

- Q. If the carriage returns part way and then fails what is the cause of the failure?

- A.
 1. The cam may not be set correctly.
 2. The tip of the toggle knockout lever may be formed too high.
 3. The pawl release link may be adjusted so as to hold the escapement pawls too far out of the escapement rack.

- Q. What is the reason if the clutch locks when the carriage is returned or when line spacing.

- A.
 1. The clutch friction disc should be inspected. It must be free from grease or oil so as not to return the carriage with too great an impact on short returns.
 2. The cam may be adjusted too close to the power roll
 3. Oil the clutch toggle joints. If a bind occurs in the toggle, the clutch mechanism will lock.
 4. See Carriage Return Mechanism - toggle knock-out lever adjustment.
 5. Adjust the carriage to return as easily as possible on short return without falling from 9 spaces from stop.
 6. Make sure the end (inside the base) of the clutch operating lever assembly 1001324 goes over the 1000285 lever.

- Q. What is the reason for the carriage return tape not winding on its pulley?

- A. This is due to a broken or incorrectly shaped clutch pulley spring. (See Clutch Pulley Springs)

- Q. If the carriage moves away from the left hand margin when the carriage return is operated for line spacing, how is it to be corrected?

- A. Adjust the escapement pawl release link on the rear rail so the escapement pawls are as close as possible to the escapement rack when the clutch operating lever is locked. If the pawls are adjusted too close they will drag when the carriage is returned.

Paper Slipping (Lifting Platen Machines)

- Q. What can be done to prevent forms slipping?

Paper Slipping (continued)

- A. 1. Increase the feed roll pressure (see Lifting Platen Carriage)
- 2. Adjust the carriage return so it will return the carriage with as little impact as possible.
- 3. Raise the forms as near to the forms carrier as possible.

(to be continued)

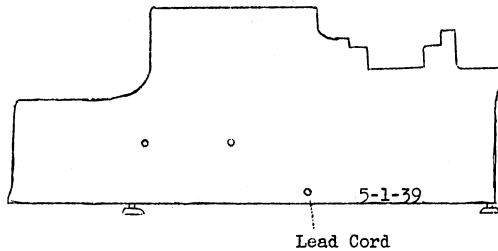
Question and Answers

Page 6

- Q. How can I cut down the time spent on service call reports?
- A. In order for the servicemen in the field to save time while making out service call reports and determining whether it is a warranty or a charge call, we make the following suggestion:

By the use of a scribe or a sharp tool, mark the date of installation on the left inside part of the base, just in back of the rubber insulating bushing used for the lead cord.

This is for the serviceman's information only and the customer need not know anything about this marking.



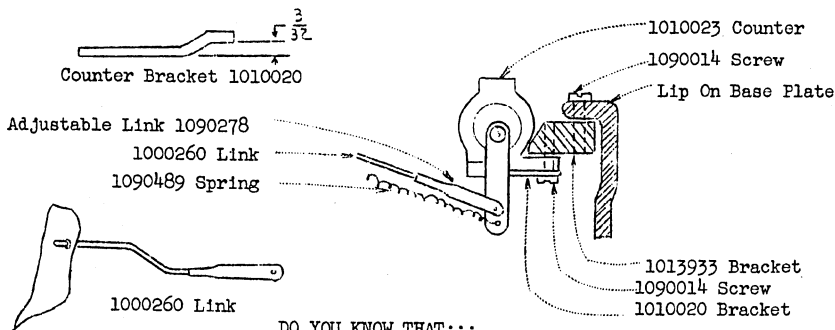
DO YOU KNOW THAT!!!

When a sudden change takes place in either the space bar, tabulator or the back space cam, the trouble can usually be traced to a missing leather stop 1090193 on that particular bell crank.

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- Q. What is the procedure used in installing a counter on the late style lifting platen machines?
- A. On all lifting platen machines above 28,332-L, it will be necessary to install a special counter bracket, 1013933, (refer to drawing) because of the small amount of clearance between the carriage and the back cover.
1. The ear on bracket 1010020 must be offset about $\frac{3}{32}$ " up, so the link will not interfere and can be adjusted, or the link can also be offset to allow link clearance on bracket 1010020.
 2. The holes in the base should be enlarged by removing the threads, using a round file, a small drill on a reamer.
 3. Assemble the brackets and counter together, using two 1090014 screws, first up through the bottom holes of bracket 1010020, through counter and into the special bracket 1013933.
 4. Attach the spring 1090489 and link 1000260 to the escapement trip lever and to the counter 1010023.
 5. Fasten the counter assembly underneath the lip on the rear of the base using screws 1090014.
 6. Adjust the counter the same as on a standard machine only it may be necessary to remove the counter each time because of its inaccessibility.

Note: There must be clearance between the link 1000260 and resistor housing 1001277.

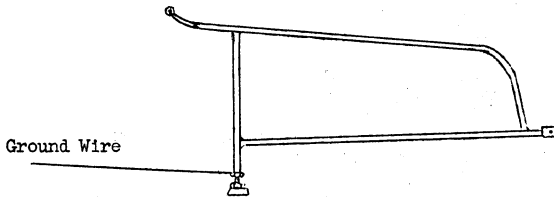


DO YOU KNOW THAT;;;
A 25 caliber rifle cleaning wire
brush simplifies the cleaning of
the motor bearings.

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- Q. What can I do to make the thin carbon sheet slip easier between the continuous forms?
- A. By eliminating the static electricity which builds up between the sheets of continuous forms and the strip carbon sheets. Static electricity is caused from atmospheric conditions and from handling the paper itself, as well as the electric machine which may discharge a little and it would be picked up in the paper.

See the drawing and the suggested way in which to ground the forms carrier to eliminate the static electricity.



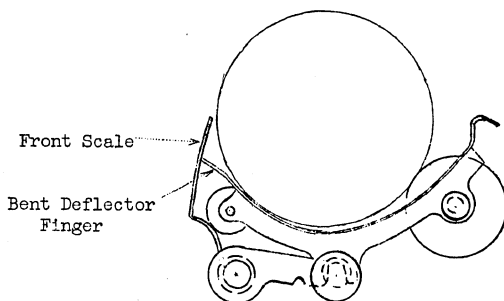
To be attached to radiator, water pipe, or electric conduit pipe.

DO YOU KNOW THAT!!!

If the vulcanized part of the carriage return tape is worked between the thumb and fore-finger, it will become pliable and conform to the diameter of the pulley.

- Q. Why is the front scale and paper deflector on a Hektowriter Machine adjusted differently from a standard machine?
- A. Many of our servicemen in the field are reforming the paper deflector fingers on Hektowriter machines so that the front scale will lay against the platen.

In order that the Hektograph ribbon will move freely in back of the original copy, the fingers on the deflector assembly have been bent down as in diagram below. The fingers in turn hold the front scale about .020" away from the platen, giving Hekto ribbon more freedom to slip and preventing ribbon breakage.



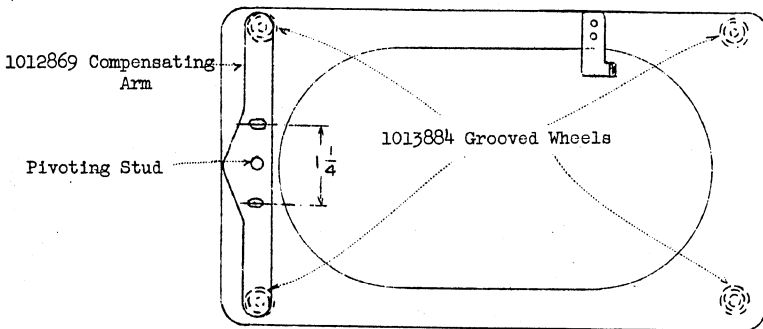
DO YOU KNOW THAT!!!

The easiest way to replace an adjustable link on the bell crank link 1000019, is to fold a small piece of paper under the broken link before removing with spring hook. The paper will hold the link up while the broken one is being removed and the new one installed.

- Q. What adjustments to make in order that the Strip Carbon Paper Carrier will stay on the track?
- A. Many of our servicemen are having trouble in adjusting the trucks to stay on the track. Sometimes the trouble is caused by the grooves in the wheels, 1012870, not being deep enough. Or, perhaps the tension spring on the two wheels, which actuates the Truck Compensating Arm, is not sufficient enough to keep the carrier in place. Or, maybe the track itself has bellied, allowing the carrier to jump off.

Listed below are suggestions offered to help correct this trouble:

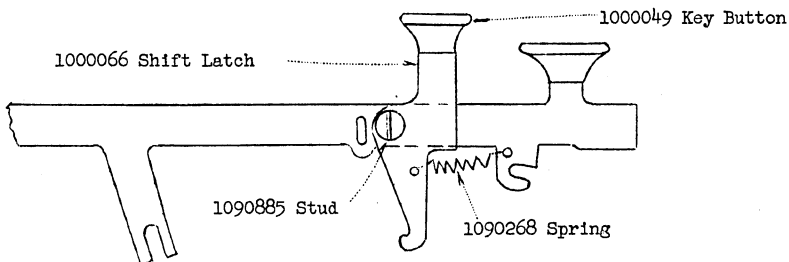
1. Replace the four grooved wheels, 1012870 to the new style wheel, 1013884. This wheel has a much deeper groove and should help eliminate most of the trouble.
2. On carriers, which jump the track between the Rear Rail Support Assembly and the Adapter Bracket on the rear of the machine, order bracket, 102856. Then locate the one hole on the Track Assembly between the first two large perforated holes on the bottom of the track, drill and attach the bracket down tight, doing the same procedure with the middle and the end holes. As this brace is brought into position it will remove the belly and keep the track the required distance between the rails.
3. Looking at the bottom view sketch of the Carbon Carrier Truck, remove the tension spring, which actuates the Truck Compensating Arm, 1012869, drill two holes using a 1000019 drill, $\frac{5}{8}$ of an inch from either side of the pivot screw. Then elongate these two holes in order that the arm can be set and locked in to position by using two screws, 1090722. When using this suggestion, it will be necessary to check the Carrier at all points on the track and make sure the carrier is tight and yet free from binds.



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Bottom View

- Q. Is it possible to replace the shift latch 1000066 on left hand shift lever without removing the shift key lever?
- A. The latch can be replaced by ordering latch 1000066, stud 1090885 and nut 1090268.
1. File off the battered head of the old stud.
 2. Install the new parts as in diagram below.
 3. Use the same 1000049 button and tension spring 1090172.



DO YOU KNOW THAT!!!

To correct irregular line spacing
use a spring with more tension on
small tooth ratchets, instead of
the regular 1090529 spring.

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QUESTIONS AND ANSWERS
(continued)

- Q. What are the points to be covered when making a QUARTERLY INSPECTION?
- A. Listed below are the points outlined as follows:
1. Grease and check platen bearings, clean with alcohol or carbon tetra.
 2. Grease line space spring 1090475, grease other points outlined on Page 5, Section 11.
 3. Remove and grease bearings on all feed rolls, eliminate end-play.
 4. Remove end play from feed actuating shaft 1000306.
 5. Check trip link 1000260, using bars 1, 21, and 42.
 6. Oil Escapement pawls.
 7. Oil and grease tabulator working parts.
 8. Clean eraser dust and dirt from carriage and rail assembly.
 9. Check motor bearings, oil hole must be open, clean armature and governor rings, grease butterfly button.
 10. Grease clutch toggle points shown on Page 5, Section 11, grease thrust bearing screw, roughen friction disc.
 11. Brush dust and dirt from all cams. Do not oil unless necessary
 12. Grease the small rivets attached to the ribbon control plate 1000079.
 13. Grease power roll shaft 1000664.
 14. Inspect carriage return and tension tapes.
 15. Grease hair pin springs 1000123 and 1000126.
 16. Oil space bar equalizing rod.
 17. Check the operation on the following:
 - Carriage return.
 - Tabulator and friction governor.
 - Back spacer.
 - Type basket shift and motion.
 - Space bar assembly.
 18. Try each character on the keyboard, checking alignment.
 19. Check ribbon feed and reverse mechanism.
 20. Check margin rack and stops.
 21. Remove all dirt and hairs from felt pad to prevent sticking cams.

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QUESTIONS AND ANSWERS
(Continued)

- Q. What is the difference between the 10,000 series and the 20,000 series machines shift adjustments?
- A. The following outline will compare the two styles according to adjustments.

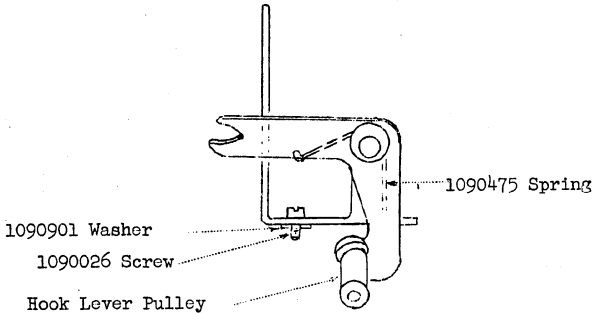
Adjustment	10,000 Series	20,000 Series
1. Cam	1. The release lever on the cam must fall on the back of the lug.	1. Same Adjustments.
2. The "T" lever eccentric screw 1090294 is used to raise or lower the head of the lever.	2. The "T" lever must be just visible over the top pin when the cam releases to shift the basket with power.	2. Same adjustments.
3. The screw and lock nut 1000132 located underneath machine adjusts the clearance on the pins.	3. Turn <u>in</u> or <u>out</u> so that the "T" lever just clears the closest pin. Remove the power roll and shift the basket to both positions by the use of the shift cam and key-lever.	3. Turn <u>in</u> or <u>out</u> so the "T" lever clears the pins approx. 1/16". Shift basket to both positions by using the cam.
4. Two screws 1090023 located on the lower part of the basket.	4. Adjust for <u>light on top or bottom</u> . Loosen bottom screw and tighten top to correct light on top. Work each side evenly.	4. Used to make "T" lever equal distance away from the upper and lower pins. If distance is greater on top - loosen bottom and tighten top, working each side evenly.
5. The knurled screw 1090075 located opposite the T head.	5. Loosen set screw, and turn knurled screw to set motion. After setting motion #2 must always be checked. Also make sure toggle is up against frame.	5. No adjustments.
6. Double lock nuts 1090034, located on screws 1000402 on each side of the basket.	6. Must just touch stops 1000410 and 1000411 with basket shifted to the capital position.	6. Raise or lower lock nuts on 1000402 screw to set motion. NnNnNnN
7. Screws 1000402 on each side of the basket.	7. Head of the screws must just touch bottom of stop, when shifted to the small case position. If set too tight, will cause breakage on stops 1000411 & 1000410.	7. Raise or lower to set <u>Light on top or bottom</u> . Clockwise raises basket to overcome light on bottom. After adjusting 1000402 screws No. 2 & 4 must always be checked Also escapement link 1000260.

QUESTIONS AND ANSWERS
(Continued)

- Q. How can I keep the carriage return tape on the hook lever pulley?
- A. On some machines, the carriage return tape rubs on the base and causes the tape to jump off the hook lever pulley, binding the carriage and causing the type to pile, skip line spacing, or it may be the main reason why the tape breaks, in some cases.

To prevent this condition, it has been suggested that we put spacers under the hook lever bracket 1000310 thus, raising the tape to clear over the left edge of the base.

To do this, it will be necessary to provide two washers, 1090901, and two screws, 1090026, eliminating the other two screws now used. It will also be necessary to check the clearance, between the hook lever pulley and the final stop 100472, located on the bottom of the front rail. We suggest that the final stop 1000472 be set to provide maximum clearance, when the line space lever is set at triple spacing.



Hook Lever Assembly 1000310

DO YOU KNOW THAT!!!

If the margin stop interferes on the toggle knock-out lever and will not allow the marginal stop to be set, bend the pawl release lever at the point where the inter-lock is actuated, using your bender 1002933 and bend toward the left side of the machine.

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QUESTION: - How can I reduce the number of broken carriage return tapes?

ANSWER: - It has been suggested by the Engineering Department that instead of removing the glaze from the friction disc with emery cloth, which only stays rough for a short time and at the same time will become thinner and uneven each time it is roughened, try and adjust the clutch by the following method.

1. Disconnect links 1000717 and 1000739 from the toggle intermediate lever 1000299.
2. Adjust cam unit to the power roll 1001328. The release lug to drop just in back of the cam lug.
3. With the clutch toggle locked up, run the carriage slowly to the right by hand, the margin stop should release the knockout lever 1014243 from 1/8" to 1/4" from the top of the incline on the knockout lever. This adjustment is taken care of by link 1000739. Make sure that the link has a little play when locked up, otherwise it will choke off the clutch toggle 1001324.
4. Set the line space lever on double spacing and space out six to ten spaces from the left hand margin, the clutch should just return at these settings, but on tripple spacing it should fail to return. This adjustment is made by loosening screw 1090003 and moving the operating lever.
5. Adjust the pawl release link 1000717 to a point where the escapement pawls can be just heard dragging against the rack when the carriage is returned. Then lengthen the adjusting link one-half turn.
6. Recheck cam setting on power roll.
7. Install washers under line space assembly suggested in Question and Answers, page 14.

If you experience difficulty in obtaining a correct return, try increasing the tension on each of the six prongs on the spider spring 1001320. Remove the spring from the end plate and bend each prong down evenly so that the tension will be distributed equally on the clutch plate.

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QUESTIONS AND ANSWERS
(Continued)

QUESTION: - What effect does 1001320 spider spring tension have on the carriage return operation?

ANSWER: - On the forms carrier machines and also on 20, 24 and 30" carriages additional weight has to be overcome by the clutch to return the carriage. Should the clutch spider spring lose its tension or become weak, it is difficult to adjust the clutch so it will hold its adjustment.

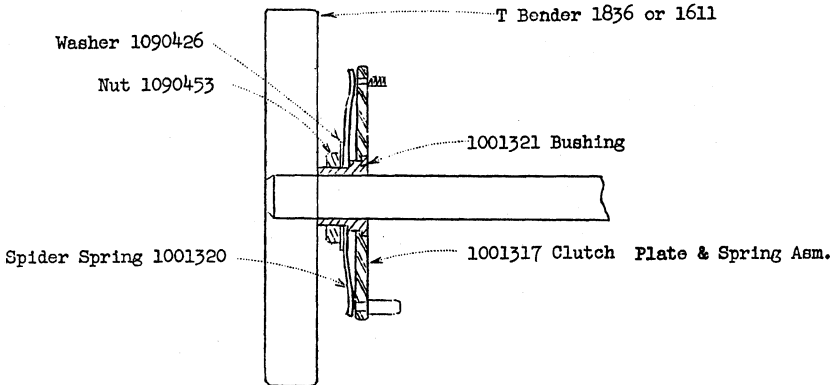
To correct this, the spider spring should be removed and given more tension. In extreme cases two weakened spider springs might be used. It is harmful to the machine to give the spider spring excessive tension as the carriage will return too hard on short returns.

As a final check, for strong spring tension, try operating the carriage return key on rapid, single line spacing. If the clutch locks up, weaken the spring.

Bending the prongs to the center (increasing the curve) increases the tension. Straightening out the prongs lessens the tension.

DO YOU KNOW THAT!!!

The clutch spider spring 1001320 can be taken off by removing the clutch end plate 1001317, running either T bender 1836 or 1611 through the hole from the outside. The handle will fit the screw slot and hold the screw while the nut is loosened with wrench 1002427.



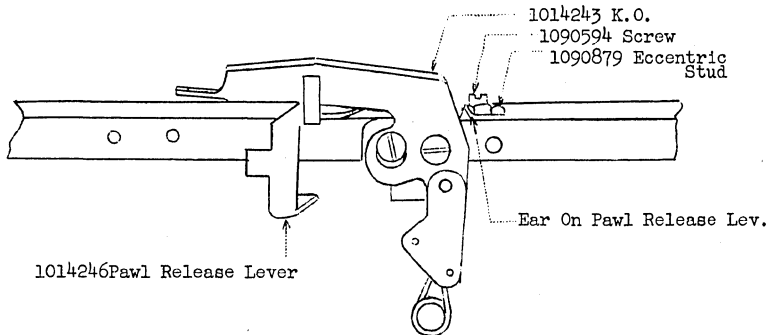
Suggested by EWM Service Dept. Detroit.

May 1, 1939

Question - What are the adjustments on the new style pawl release lever?

Answer - An engineering change which eliminates the push link 1000719 has been made on the toggle knockout lever and the pawl release lever assembly. It is being used on machines above 32330.

The purpose of this improvement is to enable the serviceman to adjust the carriage return so it will hold an even left hand margin at the same time simplify the other carriage return adjustments on the rear rail.



Adjust the toggle knockout link 1000739 to release the clutch toggle in the usual manner, making sure the toggle assembly 1014243 does not choke off the clutch operating arm assembly.

Adjust the eccentric stud 1090879 by loosening the set screw 1090754 and turning the stud, which changes the position of the ear on the pawl release lever 1014246. Check this adjustment by having the clutch locked in the "up" position. The pawls should just clear the escapement rack teeth.

If you have a machine which is giving excessive trouble with the uneven left hand margin, it is possible to install the later improvements.

DO YOU KNOW THAT!!!

The prongs on the switch lever are hardened and should not be spread to hold on the knob, but rather form a burr around the knob hole using the round head of a hammer to keep the knob intact.

QUESTIONS AND ANSWERS
(Continued)

QUESTION: How can I prevent binds in the clutch actuating lever when reassembling the clutch?

ANSWER: Tighten mounting screws #1090010 into the base while the clutch operating lever toggle is locked up. When the screws are tight and the toggle again "broken" you will find that the clutch operating lever parts will be perfectly free of binds.

**BE SURE THAT THE OPERATING LEVER #1015094 IS
CENTERED ON END PLATE #1001323.**

May 6, 1944

QUESTIONS AND ANSWERS
(Continued)

QUESTION: Do you know what to do when an Electromatic is "shifting off" in the upper case?

ANSWER: "Shifting off" is an expression used to describe the following condition: When the type is on ring and cylinder in the lower case but off ring or cylinder when shifted into the upper case. This trouble can be detected by comparison of the weight of the characters between the upper and lower case or by testing the ring and cylinder and can be corrected by using one or two .010" thick washers under the upper shift basket guide springs either at the front or rear as the case may require.

When in the upper case the type is off cylinder, it will be necessary to insert the washers under the upper springs at the front or basket end. If the type is off ring, it will be necessary to insert the washers under the rear end of the upper basket support spring.

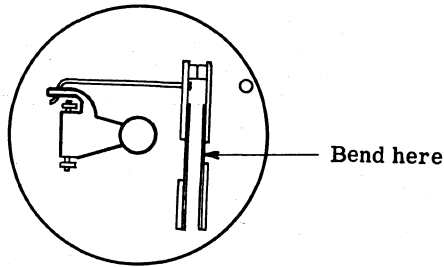
Be careful to remove only one screw at a time, insert the washer and tighten the screw before loosening the second screw to prevent further damage to the basket adjustment.

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QUESTIONS AND ANSWERS
(Continued)

QUESTION: How can I vary the speed of the motor at a predetermined setting?

ANSWER: The motor speed capacity on a certain machine can be increased by bending the outside contact spring on the governor toward center with a 1954 bender. Decrease the speed capacity by bending the contact spring outward toward the stop pin.



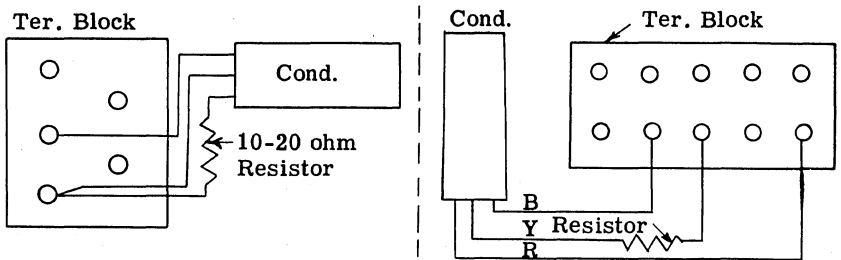
Some men use the practice of bending the connection wire between the butterfly and inside contact spring. This procedure is not recommended by the Customer Engineering Dept. because of the danger of "shorting" the governor and because it results in more or less mutilation of the governor unit which is a critical item in these times of emergency.

QUESTIONS AND ANSWERS
(Continued)

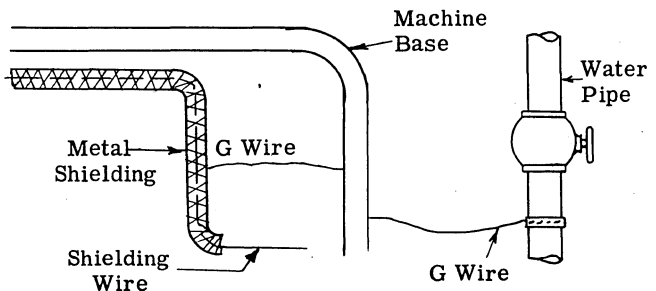
QUESTION: How can I eliminate static noise caused by our Electromatic?

ANSWER: There are cases where the radio filter #1018404 or #1001244 will not eliminate all the static noises. In cases of static radio interference take the following steps in sequence and test the results on each until the desired results are obtained.

1. Place black wire from condenser on bottom post of terminal block #433 or center post of terminal block #18723 as described in manual.
2. Install radio filter.
3. Obtain a resistor having a resistance of from 10 to 20 ohms, from your local radio shop and connect it in series with the yellow condenser lead.



4. The above three steps are usually all that is needed but in very stubborn cases it may be necessary to shield all the exposed wires, under the machine, with flexible metal shielding. This shielding must all be "grounded" to the machine and the machine "grounded" to a good "ground" such as water pipe or electric conduit.



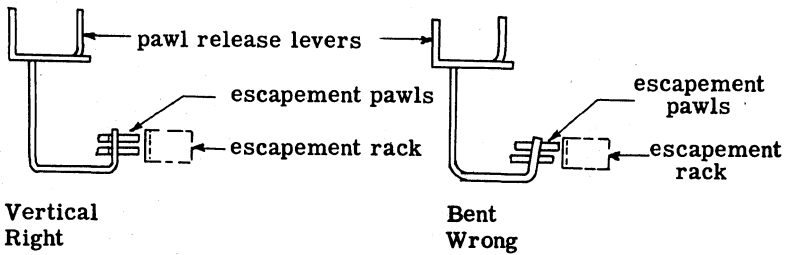
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QUESTIONS AND ANSWERS
(Continued)

QUESTION: Why is it that on some machines when the escapement pawls are held disengaged by the pawl release lever, one is nearer the escapement rack than the other? This condition sometimes is the cause of faulty tabular action or poor left hand margin.

ANSWER: This trouble occurs when the lower lug of the pawl release lever, which contacts the escapement pawls and disengages them, becomes bent.

The pawls can be equalized by bending the lug closer to the vertical position by using the #1954 bender from the left side of the machine and with the carriage all the way to the right.



QUESTIONS AND ANSWERS
(Continued)

QUESTION: What is the best method to apply name plate transfers to the Electromatic?

- ANSWER:**
1. Thoroughly clean the surface on which the transfer is to be applied. Use benzine and allow the surface to dry before proceeding.
 2. Coat the face of the transfer with ordinary white shellac. It should be allowed to dry until it becomes tacky.
 3. Press the transfer, face down, against the machine surface, using care to keep the transfer straight.
 4. Remove the transfer backing sheet from the shiny transfer sheet.
 5. Using a soft rubber roller kept wet by dipping in water, roll the transfer lightly allowing the shiny transfer sheet to soak.
 6. Remove the shiny transfer sheet leaving the transfer on the machine.
 7. Keep the rubber roller wet by dipping in water. Roll heavily over the transfer to press it against the machine surface.
 8. After the transfer has been firmly pressed to the surface of the machine, moisten a soft cloth in benzine and wipe it lightly.

A reasonable amount of time and care is all that is necessary to place a new transfer on the Electromatic.

May 6, 1944

QUESTIONS AND ANSWERS
(Continued)

QUESTION: What can be done to minimize service difficulties on the Hektowriter?

ANSWER: The following suggestions originated at the Chicago and Columbus offices respectively.

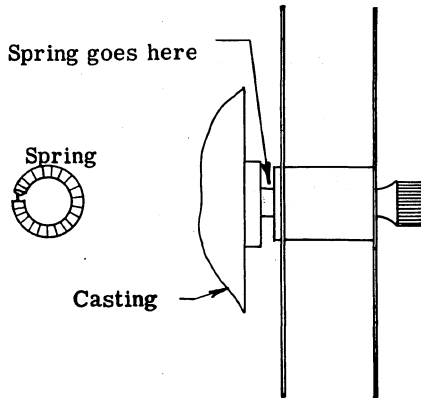
REWIND SPOOL CHECK PAWL #1019543.

The check pawl occasionally may buckle and cam past center becoming inoperative or may bend enough to slip off the rewind spool teeth.

We have made check pawls of heavier material. They are now in stock under part number #1019543 and can be ordered in the usual manner. Washer #1091504 should be used.

SUPPLY SPOOL RIBBON OVERRUNNING

Shorten spring #1090165 (spring used on ribbon reverse) approximately 1/4". Hook the spring around the Supply Spool Shaft between the flange and the casting. The spring will act as a break to prevent the spool from feeding the ribbon too fast. It will also act as a cam to prevent the spool from back winding.



Refer to drawings, Section 21, Page 4, Service Manual.

INSPECTION

Every time the serviceman is called to correct a mechanical adjustment he should thoroughly inspect the machine as outlined below:

- (1) The platen must turn freely in its bushings.
- (2) Inspect the line space mechanism; the index pawl must clear the platen ratchet when set for triple spacing. Check the index pawl spring and the carriage return tape hook lever spring.
- (3) Inspect the ribbon feed and reverse mechanism.
- (4) Inspect the carriage return and tension tapes.
- (5) Inspect the margin stops.
- (6) Remove the platen, examine the feed rolls and the platen feed roll actuating shaft for side play.
- (7) Check the escapement trip link adjustment.
- (8) Try the tabular set and clear levers.
- (9) Check the operation of the following:
 - Carriage return
 - Tabular and friction governor
 - Type basket shift
 - Type basket motion
- (10) Try each character on the keyboard.
- (11) Oil the following:
 - Motor bearing oil tubes
 - Clutch toggle rivets
- (12) Grease the following:
 - Clutch end plate
 - Motor governor adjusting screw
 - Shift toggle hairpin springs
- (13) Clean the carriage rails - do not oil.
- (14) Brush dirt from cam units.

OILING AND GREASING

Apply oil with a wire dropper or a fine pointed brush. Do not use an oil can; an excess of oil collects dirt. Oil and grease must be kept from the rubber of the platen, feed rolls and power roll. The clutch disc and electrical wiring must also be kept free from oil.

Oil the following parts:

- (1) Motor - 6 to 8 drops every six weeks.
- (2) Escapement pawls.
- (3) Escapement trip lever bushing.
- (4) Back space pawl.
- (5) Toggle knock-out lever.
- (6) Tabular lever.
- (7) Index pawl carrier.
- (8) Index pawl stud.
- (9) Detent roller arm.
- (10) Platen bushings.
- (11) Feed roll bearing points.
- (12) Clutch toggle joints - inside and outside of frame.
- (13) Ribbon feed and reverse mechanism.
- (14) Type bar toggle joints.
- (15) Ribbon guide mechanism - toggle joints.
- (16) Space bar equalizing rod.
- (17) Shift toggle joints.
- (18) Power roll washer - soak in oil.

Do not oil cams.

Do not oil type bar segment.

Grease the following with IEWM "Non-fluid Oil"

- (1) Motor governor adjusting screw.
- (2) Shift toggle hairpin springs.
- (3) Clutch end plate.
- (4) Ribbon lift bar where ribbon feed levers contact it.

The worm housing should be refilled when overhauling the machine (use Non-fluid oil). The power roll is filled with fibre grease which will last the life of the power roll.

May 6, 1944

INSTALLATION AT CUSTOMER'S OFFICE

The machine must be installed to allow space for whatever attachment may be used, such as Line-a-Time, Error-No, etc.

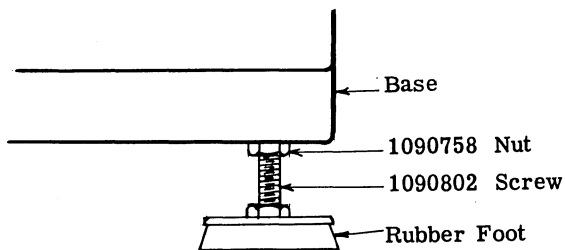
Always use the felt pad under the machine as it deadens the sound and keeps the machine from sliding when not bolted.

The machine may be bolted to the desk by machine screws where it is necessary. To make it easier to detach the machine for service, use Studs 1090746, which are screwed into the holes in bottom of the base and act as pins to keep the machine from sliding by extending into holes in the top of the desk.

It may be necessary to raise the operator's chair to the correct height for the International keyboard. Make sure the machine is used on the correct voltage and current.

Before turning on a machine in a customer's office make sure the cams have not been released in handling the machine. Also see that the impression indicator lever is set at the position shown on the tag fastened to the machine.

In certain types of desk wells it may be necessary to raise the International so that the carriage will not strike the edge of the desk well. This can be easily done by using a longer screw to hold the rubber feet to the machine base. See drawing below.



May 6, 1944

INSTRUCTIONS FOR PACKING AND SHIPPING MACHINES

To avoid having the escapement pawls broken or teeth knocked out of escapement rack in shipment, it is necessary to "float" the carriage. This is done by wiring the carriage release universal bar to the tab rack.

All 12" carriage machines are packed in cartons. We cannot place too much stress on the importance of packing machines correctly in cartons. It is a good idea to study the positions of inserts when unpacking shipments, making sure to use ALL of the inserts in the proper location. **THIS IS IMPORTANT.** Very often machines returned to factory are damaged due to carelessness in packing.

All long carriage machines are packed in wooden boxes in excelsior. After releasing the escapement pawls as described above, the carriage should be tied in some manner to prevent sliding back and forth.

Machine should then be well wrapped in heavy paper. **THIS IS IMPORTANT.** The excelsior dust in cams and other small parts can cause serious damage.

With the exception of the Pacific Coast, all railroads give "Store Door Delivery" and "Store Door Pick-up" free of charge. Do not use Railway Express unless shipment weighs less than 30 lbs. Use freight. The charges are a great deal less. The best procedure is to note routings used by the shipping department, using same carriers when shipping to Rochester.

May 6, 1944

General Information

Page 5

December 1, 1941

EWM CUSTOMER ENGINEERING DEPARTMENT
LETTER OF INSTRUCTION #61

TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING
SUPERVISORS#

SUBJECT: FREIGHT RATES

Freight rates are dependent to a great extent upon commodity classification.

In order to assure us the lowest rates on freight being returned to the factory, please describe the freight as "Typewriters" or "Typewriter Parts", as the case may be. Do not describe typewriters as "machines".

When a shipment of warranty parts is being returned, do not describe the shipment on the freight bill as "Warranty Parts". Describe the shipment as it really is, "Typewriter Parts".

The factory has been receiving many parts which are doubtfully classified. In each of these cases the freight carrier's billing clerk has automatically assessed the highest rate. Please help avoid this unnecessary expense.

R. F. Sheridan
EWM Manager, Customer Engineering

JWLenhart/jfs

December 5, 1941

EWM CUSTOMER ENGINEERING DEPARTMENT
LETTER OF INSTRUCTION #62

TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING
SUPERVISORS, AND EWM CUSTOMER ENGINEERS

SUBJECT: TOOL REPLACEMENTS

Due to the present difficulty in obtaining tools, we must ask that you return certain worn or broken tools to the factory before ordering replacements.

The following tools must accompany all orders for replacements:

01401	Tye
02902	Type Cutting Pliers
02412	Type Bar Maulers
07472	End Wrench
07470	End Wrench
07471	Box Wrench
01372	Spinner
07473	Screw Driver
03805	Socket Wrench
03806	Socket Wrench
03966	Socket Wrench
03569	Soldering Gage
03809	Type Bar Benders
07474	Screw Driver
07475	Screw Driver
07476	Screw Driver

Please address the tool requisition together with the worn tools to the Customer Engineering Department, Rochester, New York.

R. F. Sheridan
EWM Manager, Customer Engineering

JWLenhart/jfs

January 30, 1942

EWM CUSTOMER ENGINEERING DEPARTMENT
LETTER OF INSTRUCTION #64

TO: ALL EWM SALES AGENTS, IBM CUSTOMER ENGINEERING
SUPERVISORS, AND EWM CUSTOMER ENGINEERS

SUBJECT: REPORTS TO FACTORY ON ALIGNMENT

In the past, alignment trouble reports to the factory have not been complete enough to indicate the true condition of the alignment at the time of the machines arrival at its destination.

Therefore, the following important rules are being laid down to help you make reports which will aid the factory in determining the cause of faulty alignment:

1. Read the yellow caution tag carefully on both sides.
2. Set Motor Speed Indicator where recommended.
3. Insert recommended copy. (1 sheet bond, stencil, etc.)
4. Check line supply for proper current and voltage.
5. Make the following strike-up BEFORE making any adjustments to type:

NnNnNnNnNn Serial No. 112-66899 1234567890

Impression lever set at () as recommended on caution tag

NANBNCNDNENFNGNHNINJKNKLNLMNONPNQNRNSNTNUNVNVWVXNYNZ
nanbncndnenfngnhninjnknlnmnonpnqnrnsntnunvvnwxnynz

N@N#N\$N%N&N*N(N)N N:N'N?N;N
n1n2n3n4n5n6n7n8n9n0n-n',n/n

AMARANTH ORONOCO URUGUAY SECEDES INITIATION PHILADELPHIA
amaranth oronoco uruguay secedes initiation philadelphia

R. F. Sheridan
EWM Manager, Customer Engineering

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